FOOD MANAGEMENT
AND
CHILD CARE

THEORY

VOCATIONAL EDUCATION

HIGHER SECONDARY - SECOND YEAR

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FOOD MANAGEMENT AND CHILD CARE

(Vocational Course)

Higher Secondary - Second Year

Syllabus - Theory

June : 1. Quality of Food

1.1 Food selection, purchasing and storage

1.2 Food Adulteration - Problems,Types of adulterants, Identification of adulterants

1.3 Food laws and standards - PFA, FPO, BIS, Agmark, Consumer Protection Act.

1.4. Sensory evaluation

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2.2. Lactation -food and nutrient requirements

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2.4. Immunization - communicable diseases, control measures, immunization schedule, management of sick children.

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10.3. Project - case study, questionnaire, observation and sociometry

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1. FOOD QUALITY

1.1. Food Selection, Purchasing and Storage

Health is the attainment and maintenance of the highest state of mental and physical vigour an individual is capable. No single food provides sufficient amount of all the essential nutrients to keep human beings healthy. Different foods have widely differing nutrients. Nutritional requirements vary according to age, sex and level of activity of an individual. A balanced diet is one which provides sufficient amounts of all the essential nutrients. Selection and purchase of good food is the basis for preparing and serving of balanced meals that are acceptable to the consumer.

Internal and external factors influencing food choices and selection

It is universally accepted that the nutritional value of food is not primarily what makes people to eat. But it is the colour, flavour, texture, taste, temperature and presentation which influence a person to eat. Besides these, some internal and external factors also influence the food selection which are given below:

i. Hunger and Appetite : Hunger is the stimuli within the body that indicates to us that we need to consume food. The satiety value of the food depends upon numerous external factors. Appetite consists of the pleasurable sensations provided by and associated with the enjoyment of foods, its appearance and palatability.

ii. Five senses : The five senses help us to govern our food choices. Qualities such as appearance, taste, smell, texture and temperature are some of the most familiar sensory factors. Aromas increase or decrease our acceptance of food. The smell of bread baking and meat roasting in the kitchen may be appealing, on the other hand non food odours are unpleasant.

iii. The bodys' system, organs, muscles and cells : One of the body's major activities is processing food to release nutrients, thereby providing nourishment to sustain life or heal disease. These processing activities are highly interconnected. When a person decides to eat, the lips, teeth, tongue and salivary glands begin the process by enabling mastication and swallowing of food. Hypothalamus located at the base of the brain exercise control over the feelings of hunger and satiety and behaves as a thermostat turning and shutting off the feelings that make us to eat.

iv. Social influences : A person's age and gender, a family's social and economic status, the availability of foods in certain locality and people's religious and health beliefs may influence food selection.

a) Family customs : The family environment greatly influences food choice and habits. A positive attitude about food is more likely to develop when the entire family comes together for meals in a happy and relaxed atmosphere.

b) Social patterns : Foods are often classed as being for babies, young children and adults. For example milk for babies, peanut, butter biscuits, sandwiches for young children, burgers, pizza for teenagers and tea or coffer for adults. Foods carry gender connotations. Meat, potato, pie may be a type of masculine meals, whereas fruits, salads and sherbets

are classed as feminine foods. Some foods have more prestige value than others and are used as company foods to honour friends or business associates.

c) Economic factors : Poverty can adversely affect the formation of satisfactory food habits. Inadequate income usually limits both the quantity and variety of foods available. It may lead to unhealthy food choices too.

v) Psychological influences : Food is often used to express feelings of happiness, love and security or to cover up emotions of worry, grief and loneliness. The baby who is held while being fed, associates food with warmth and security. But a child who is sudden for his merry actions associate mealtimes with unhappiness. Some teenagers overeat to compensate for a poor report card. Elderly persons living alone often eat too little, because they are lonely and unhappy.

vi) Religious influences : Foods have symbolic meaning in all religions. Some religions use food in celebrations, or place restrictions on the preparation of certain foods, for example Christians abstain from meat on fast days (Good Friday), Muslims fast for a month during Ramalan each year from dawn to dusk. Hindus abstain from non-vegetarian foods during certain months or pooja times.

vii) Geographical influences : Food habits result largely from foods available in particular seasons. Fruits and vegetables particularly are best in colour, flavour, taste and size in the prime of their season in contrast to off season produce. The careful selection of seasonal foods give wholesomeness of individual food and have its effects on the dishes prepared. A brief outline on the characteristics of foods for proper selection is given in the following Table 1.1.

Table 1.1: Food Selection Guide

S.No.	Fresh foods	Indicators of wholesomeness
1.	Cereals, pulses, legumes, oilseeds	Free from insect infestations, stone. Even shape, colour and size of grains
2.	Fruits and vegetables	Good natural colour, firm, evenly shaped, mature, free from dirt, blemishes or insecticidal residues
3.	Milk and milk products	Good colour, opaque, preferably sealed bottles or packs, no sour odour or taste, uncurdled
4.	Poultry	Good overall shape, free from bruises and smell
5.	Meat	Firm flesh, fine grain, age of the animal seen from skeleton colour of the muscle
6.	Fish	Free from bruises and bad smell
7.	Eggs	Smooth, velvetty surface, translucent, no cracks
8.	Fats	Fat - no rancidity, oil, viscous clean in properly sealed containers.

viii. Contemporary trends : Food availability, people's food selections and eating habits depend on world, national and local events. Droughts, floods, famine, war and political unrest continue to affect food choices by necessity.

To obtain optimal nutrition throughout life everyone depends on choices from a wholesome, nutritious, processed, safe and sanitary food and water supply at each meal. Food and water are processed by a variety of methods to accomplish these goals. Thus an understanding of the characteristics of different foods, how best they can be utilised for the different needs of people, will help to flourish the health of the people.

Food purchasing : Purchasing good food is the basis for preparing and serving meals that are acceptable to the customer. Persons responsible for proper buying of foods must know the following aspects:

- How various commodities are marketed and handled
- What food and food products are available in the market in the particular season
- Prevailing prices and fluctuations occurring from time to time
- Size and type of packs available for bulk purchasing
- Quantities of each commodity to be bought at a time
- Suppliers and their terms
- What quantity and quality are best suited in the production of meals
- How much food costs be controlled at the purchasing point
- Available kinds of storage space
- Relative keeping quality of different foods
- Communication of requirements to the supplier to ensure that the right quantity is received in the right form and at the right time.

Food Buyer: Every food buyer needs to possess certain qualities of work effectively such as

- High moral and ethical values, not influenced by the supplier in any way.
- Skill in identifying markets
- Accepting food brands that are marked by standardizing agencies such as ISI, Agmark etc
- Devotion to duty, being open minded but alert.

Buying food: Purchasing of food depends upon the need. The different methods of purchasing foods are discussed below.

i. Open market buying: Open market method of buying is an informal method and can easily be adopted by the individual. It is generally used for purchasing of perishable foods like fruits, vegetables, meat, etc. Small enterprises often buy directly from open market, wholesale markets, food stores and co-operative stores and transport the required quantities to the food establishment.

ii. Formal buying : In this method, formal quotations are invited from departmental store for each category along with specifications regarding date of delivery, terms of payment, etc.

iii. Negotiated buying : As the name itself indicates this involves negotiation between buyer and seller regarding prices and quantities. This method is generally used for seasonal items which are limited in supply where both buyer and seller are keen that the product is lifted quickly.

iv. Wholesale buying : This type of buying helps in the purchasing of goods at specific price for a future period. This method is also suitable for larger organisations or central purchase departments. Whatever method is used for purchasing food it is advisable to make the procedure simple with minimum work.

Factors which help in food buying

i. Price : This enables cost comparison with different brands of similar products.

ii. Labelling : Labels which indicate quality symbols like ISI, FPO, Agmark, date of manufacture, expiry date, maximum retail price per kilogram or packs, nutritional information, will enable the food buyer to select foods properly.

Storage : The first principles of storage is to know what, where, when it is needed by the user. Most food materials need to be stored for different length of time and at different temperature to preserve their wholesomeness till required for preparation and service. Food service operations store raw or cooked ingredients in storage areas before production or service. Since the food items stored can represent a great deal of money, it is imperative to see that all the items purchased are properly stored and are issued in a definite sequence.

Loss or waste of food or non-food items may occur due to improper storage, theft and insect infestation. Products piled without any logical arrangements may be subject to loss in addition to posing safety hazard. It is advisable to set limits on the number of persons who have access to storage areas. In other words the fewer the people who go in and out of storage areas, the more secure and efficient the food service operator will be. Storage areas should have easy access from the receiving area and from the preparation and production area. Storage areas should be clean and neatly arranged. They should have capability to store all goods. Various guidelines and sanitary requirements must be followed. The temperature and humidity in storage area have to be controlled and should be kept at the optimum level so that food losses are prevented.

Types of storage

In any type of food service operation three different storages are essential. (i) Dry storage (ii) Refrigerated storage (iii) Frozen storage

i. Dry storage : It should be clean, adequately ventilated with sufficient air circulation and with desired humidity. Food normally stored in dry storage include canned goods, flour, sugar, shortenings, spices, cereals, certain fruits like bananas and certain vegetables like onions and potatoes. Care should be taken to see that there is enough air circulation and the food products are not affected in any way by being near hot places, drainage or other

utility pipes. Frequent checks are necessary to protect stored products from vermin, rodents and insects that can survive and thrive at the prevalent temperature. Temperature for dry storage areas should range from 40^0 to 75^0F (5^0 to 24^0C). Some perishable foods such as potatoes and onions should be stored at slightly lower temperature i.e., 40^0 to 55^0F (5^0 to 13^0C). Storage areas should be kept clean by following regular cleaning schedules.

ii. Refrigerator storage : Since proper temperatures are critical for refrigerated storage it is imperative to have a regular check on temperature. The efficiency of a refrigeration is based on several factors including the type of refrigeration, type of compressor, extent of insulation, capacity of the storage area and amount of food and its arrangements in the storage area.

Refrigerator storage is used for storing cooked or partially cooked food in addition to thawing meats. Care should be taken that there are no leakages from or on the containers in which these items are placed. It is not advisable to store hot items in the refrigerated storage as it may take a long time for them to reach safe temperature.

iii. Frozen storage

The number of foods being placed under frozen storage is increasing rapidly. Many items are available in the market in the frozen form, making it important for a food service operation to have adequate frozen storage. Many frozen items should be ordered in optimum size containers or packages to avoid the risks of thawing large quantities of foods. Many food items are suitable for frozen storage soon after cooking particularly in the cook freeze system. With this method foods are continuously prepared, often portioned and then kept in the freezer until use. Any accumulation of ice should be cleared as frequently as possible which will ensure maintenance of the desired temperature in the storage area. Frozen space is also needed to store large quantities of items purchased. It is advisable that the fewest possible number of persons have access to storage areas and assume the responsibilities of issuing items.

Open Market

Refrigerator

1.2. Food adulteration – Problems, types of adulterants, identification of adulterants

Food adulteration : Adulteration of food stuffs is commonly practised in India by the trade. The consumers like to get maximum quantity for as low price as possible. When the price of the food product is higher than the price which the consumer is prepared to pay, seller is compelled to supply a food product of inferior quality, thus adulteration occurs.

Definition: Adulteration is defined as the process by which the quality or the nature of a given substance is reduced through

i. The addition of a foreign or an interior substance

ii. The removal of a vital element

A good example for the first one is addition of water to milk and that for the second is removal of fat from milk. Adulteration of food may endanger health, if the physiological functions of the consumers are affected due to either addition of a deleterious substance or the removal of a vital component.

Problems due to adulteration: Food adulteration, apart from cheating the consumers, often results in disorders or diseases. Some of the foods commonly adulterated in India and problems are as follows.

Pulses like masoor, black gram and channa are mixed with kesari dhal. Consumption of kesari dhal for a long time produces lathyrism which results in paralysis of the lower limbs.

Roasted tamarind and date seeds are ground and adulterated with coffee powder. Edible oils and fats are adulterated with cheap edible and nonedible oils. Argemone seeds resemble mustard and are used to mix with mustard seeds. Argemone oil itself extracted from the seeds, is used to adulterate oil such as coconut, sesame and groundnut. Argemone oil is poisonous and its use results in dropsy in human beings. Fats and oils are also adulterated with petroleum products causing gastro intestinal disturbances.

The most frequently used food adulterant in India is colouring matter. Colour is used in many foods such as milk products, confectinory, soft drinks, alcoholic beverages, tea and spices. Colours are also added to foods such as egg preparations, bakery products, fruit products and others. More than 70 per cent of the colour containing marketed samples of foods are found to contain nonpermitted colourants like lead chromate and coal tar dyes. Use of foods containing nonpermitted colourants results in various health hazards.

Types of Adulterants: Adulteration may be intentional or unintentional. The former is a willful act on the part of the adulterator intended to increase the margin of profit, whereas incidental contamination is usually due to ignorance, negligence or lack of proper facilities.

Intentional adulteration : Intentional adulterants are sand, marble chips, stones, mud, chalk powder, water, mineral oil and coal tar dyes. These adulterants cause harmful effects on the body. Table 1.2 gives intentional adulterants in different foods and methods of detection.

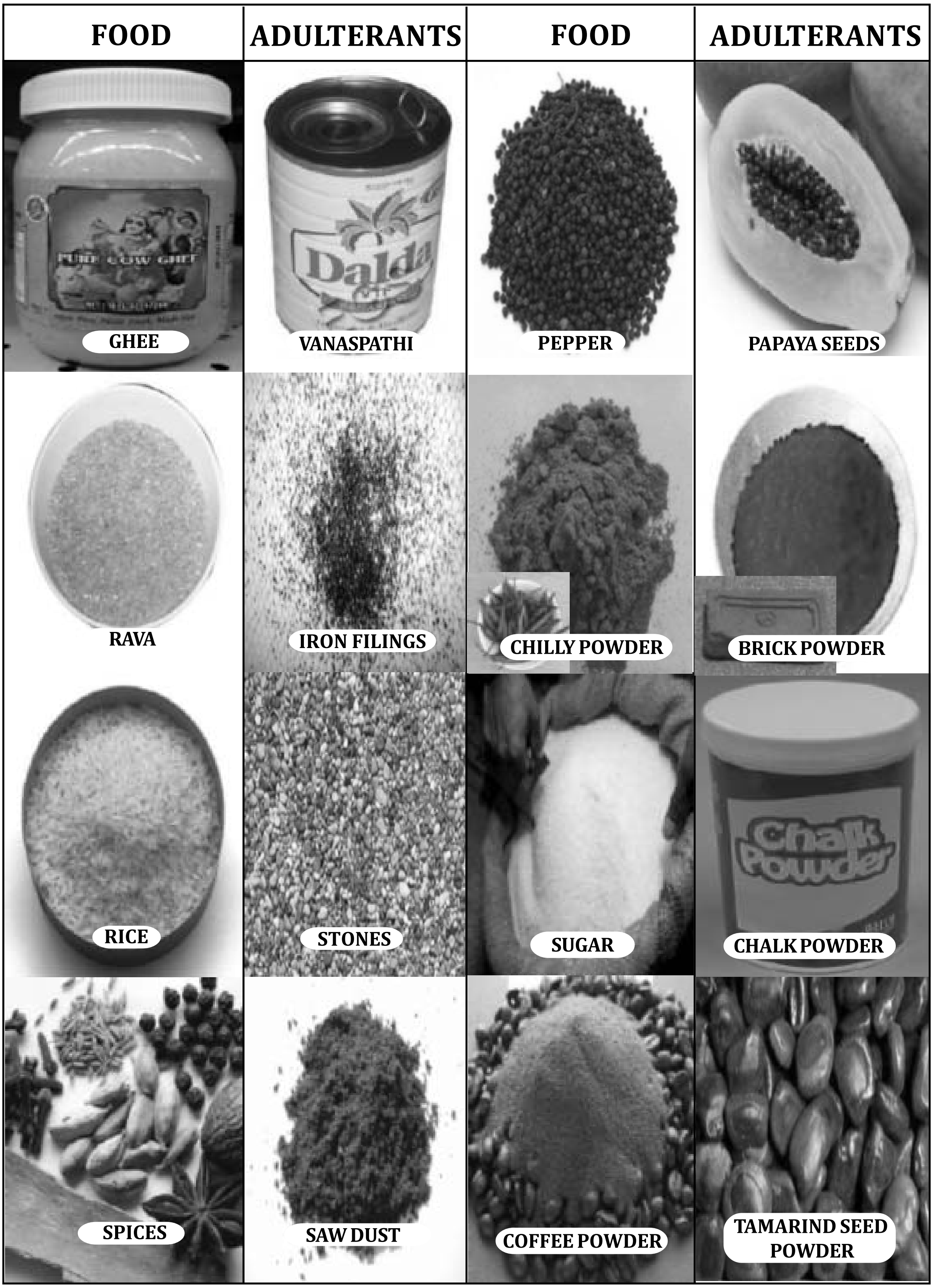
Table 1.2 : Intentional Adulterants and Methods of Detection

S.No.	Name of the food	Adulterant	Simple method for detection of adulterant
1.	Ghee or butter	Vanaspathi	Take about one teaspoonful of melted ghee or butter with equal quantity of concentrated hydrochloric acid in a test tube and add to it a pinch of cane sugar. Shake well for one minute and test it after 5 minutes. Appearance of crimson colour in lower layer shows the presence of vanaspathi
2.	Vegetable oil	Argemone oil	Add 5 ml of concentrated nitric acid to 5 ml of sample. Shake carefully, allow to separate. Yellow, orange yellow, crimson colour in the lower acid layer indicates adulteration
3.	Honey	Molasses (sugar and water)	A cotton wick dipped in pure honey when lighted with a match stick burns. If adulterated the presence of water will not allow the honey to burn. If it does, it will produce a crackling sound
4.	Pulses (dry green peas)	Colour dye	Sample is kept immersed in water for about half an hour and stirred. Colour separation indicates adulteration
5.	Rava	Iron particles	By moving a magnet through it iron particles can be separated
6.	Rice	Marble or other stones	A simple test is to place a small quantity of rice on the palm of the hand and gradually immerse the same in water. The stone or chips will sink
7.	Spices (Ground)	Powdered bran and saw dust	Sprinkle on water surface. Bran powder and sawdust float on the surface
8.	Cumin seeds	Grass seeds coloured with coal tar dye	Rub the cumin seeds on palms. If palms turn black adulteration is indicated
9.	Black pepper	Dried seeds of papaya fruit	Papaya seeds are shrunken, oval in shape and greenish brown or brownish black in colour
10.	Turmeric	Metanil yellow	Take a teaspoonful of turmeric powder in a test tube. Add a few drops of conc. hydrochloric acid. Instant appearance of violet colour which disappears on dilution with water. If the colour persists, presence of metanil yellow is indicated

S.No.	Name of the food	Adulterant	Simple method for detection of adulterant
11.	Chilly powder	Brick powder, sand, soapstone	Any grittiness that may be felt on tapping the sediment at the bottom of glass confirms the presence of brick powder or sand. Smooth white residue at the bottom indicates the presence of soapstone
12.	Cloves	Volatile oil extracted cloves	Extracted cloves can be identified by its small size and shrunken appearance
13.	Sugar	Chalk powder	Dissolve in a glass of water, chalk will settle down at the bottom
14.	Milk	Mashed potatoes, sweet potato and other starches, water	Add a drop of tincture iodine. Iodine which is brownish in colour turns to blue if starch is present The presence of water can be detected by putting a drop of milk on a polished surface. The drop of pure milk either stops or flows slowly leaving a white trail behind it. Where as milk adulterated with water will flow immediately without leaving a mark
15.	Coffee powder	Tamarind or date seed powder	Sprinkle the suspected coffee powder on white blotting paper and spray 1% sodium carbonate solution on it . If tamarind or date seed powder is present, it will stain the blotting paper into red
16.	Wheat flour	Maida flour	When dough is prepared from resultant wheat flour, more water has to be used and chappathies prepared out of this will blow out. The normal taste of chappathies prepared out of wheat is some what sweetish whereas those prepared out of maida adulterated wheat flour will taste insipid
17.	Common salt	White powdered stone, chalk	Stir a spoonful of simple salt in a glass of water. The presence of chalk will make the solution white and other insoluble impurities settle down

New adulterants

The newer adulterants include the legumes such as imported toxic lentils marketed as local lentils, veterinary drug residues in milk, flours made from mouldy wheat, animal fat in bakery products and industrial contamination in vanaspathi. Ginger is used widely in culinary practice in India in the fresh or dry form. Dry ginger is often coated with a blue



Intentional Adulterants in Food

coloured dye ultramarine blue to prevent insect infestation. It is an inorganic pigment used as laundry whitener.

Incidental contamination

i. Contamination of foods with harmful microorganisms

Raw foods such as meat, fish, milk and vegetables grown on sewage are likely to be contaminated with harmful microorganisms. These are generally destroyed during cooking or processing of food. Recent studies have shown that food grains, legumes and oil seeds when stored in humid atmosphere are infected by pathogenic fungus which can cause serious illness.

ii. Metallic contamination : If arsenic, lead or mercury get accumulated in the body they can be harmful. Lead is a toxic element and contamination of food with lead can cause toxic symptoms. For example, turmeric is coated with lead chromate. Lead brings about pathological changes in the kidneys, liver and arteries. The common signs of lead poisoning are nausea, abdominal pain, anaemia, insomnia, muscular paralysis and brain damage. Fish caught from water contaminated with mercuric salts contain large amounts of mercury. The toxic elements which are toxic in small doses are cadmium, arsenic, antimony and cobalt. Table 1.3 gives the toxic effects of some metals and chemicals.

Table 1.3: Toxic Effects of Some Metals and Chemicals

S.No.	Name	Foods commonly involved	Toxic effects
1.	Arsenic	Fruits sprayed with lead, arsenate, drinking water	Dizziness, chills, cramps, paralysis leading to death
2.	Cadmium	Fruit juices and soft drinks that come in contact with cadmium and plated vessels, crabs and oysters	Excessive salivation, liver, kidney damage
3.	Copper	Acid foods in contact with tarnished copper ware	Vomitting, diarrhoea. abdominal pain
4.	Lead	Some processed foods, lead water pipes	Paralysis, brain damage
5.	Tin	Canned foods	Colic, vomitting
6.	Zinc	Foods stored in galvanized iron ware	Dizziness, vomitting
7.	Pesticides	All types of foods	Acute or chronic poisoning causing damage to liver, kidney, brain and nerves leading to death
8.	Antibiotics	Meat from animals fed antibiotics	Drug resistance, hardening of arteries, heart diseases

S.No.	Name	Foods commonly involved	Toxic effects
9.	Fluoride	Drinking water, sea foods, tea	Excess fluoride causes flourosis (mottling of teeth, skeletal and neurological disorders)
10.	Oxalic acid	Spinach, amaranthus	Renal calculi, cramps, failure of blood to clot
11.	Nitrates and nitrites	Drinking water, spinach and meat products	Cancers and tumors in the liver, kidney and lungs

iii. Other Incidental Adulterants

Incidental adulterants are pesticide residues, tin from can, droppings of rodents and larvae in foods. Metallic contamination with arsenic, lead and mercury can also occur incidentally.

Pests such as rats, rodents and insects introduce into the food a high degree of filth in the form of excreta, bodily secretions and spoilage microorganisms. Chemicals like DDT are absorbed by the small intestine when ingested. The toxins usually pile up in the fatty tissues of such vital organs as the thyroid, heart, kidney, liver, mammary gland and damage these organs. They can be transferred from the umbilical cord blood to the growing foetus or through breast milk to infants. In children the disease, apart from crippling them, inhibits their growth. Poison chain is shown Figure 1.1

Contamination begins when farmers use pesticides to protect crops. The health department sprays pesticides to control malaria causing mosquitoes

↓

Residues remain long after spraying pesticides. Cattle fodder and chicken feed are affected. Ground water is poisoned. Meat, fish, milk and egg are affected by toxins

↓

More spraying is undertaken to prevent fungus and rodents from attacking stored grain. This further increases the residue levels in food stuffs

↓

Sellers dip vegetables in pesticides to make them look fresh as well as to preserve them. Oils and sweets are adulterated with prohibited substances

↓

Washing vegetables and other food stuffs helps to some extent. But cooking rarely destroys toxic residues. When ingested, pesticides are absorbed by small intestine

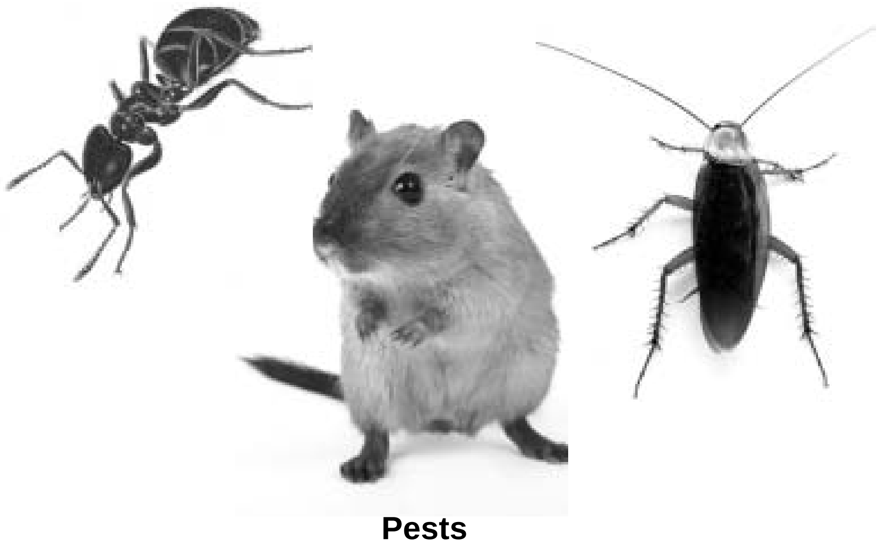
↓

The fatty tissues distributed throughout the body store these pesticides. These can damage vital organs like the heart, brain, kidney and liver

Figure 1.1 : The “Poison Chain”. Sequence of Incidental Adulteration in Foods

This incidental poisoning can be prevented by :

- Regular market surveys to warn people on the dangerous build-up of toxins in food.
- Stepping up the integrated pest management programme to teach farmers to use pesticides judiciously. No spraying should be done a week before harvest.
- Using safer pesticides
- Washing vegetables thoroughly before cooking.



Pests

iv. Packaging hazards

Polyethylene, polyvinyl chloride and allied compounds are used to produce flexible packaging materials. While this method of packaging is very convenient, it must not contain any noxious thermal breakdown products which would be injurious to health. Further, temperatures used for heat sealing or sterilization should not result in formation of toxic residues. It has been observed that in foods like pickles, the acid and oil could attack the plastic packaging material and create a health hazard. To avoid such incidences, it is essential that only food grade plastic packaging materials be used for packaging foods.

Packaged Foods

1.3. Food laws and standards – PFA, Agmark, BIS, FPO, Consumer Protection Act

Food laws and standards

Effective means of food quality can be achieved by legislative measures, certification schemes and public participation and involvement in the programme. The Government of India is fully aware of the possibilities of food being adulterated. To meet a country's sanitary requirements, food must comply with the local laws and regulations to gain market access. These laws ensure the safety and suitability of food for consumers and also govern food quality and composition standards.

Food Safety and Standards Act

The Indian parliament has recently passed the Food Safety and standards Act, 2006 that overrides all other food related laws. It will specifically cover eight laws.

- Prevention of Food Adulteration Act, 1954
- Fruit Products Order, 1955
- Meat Products Order, 1973
- Vegetable Oil Products (Control) Order, 1947
- Edible Oil Packaging (Regulation) Order, 1998
- Solvent Extracted Oil, Deoiled Meal and Edible Flour (Control) Order, 1967
- Milk and Milk Products Order, 1992
- Essential Commodities Act, 1955 (relating to food)

The Act establishes a new national regulatory body and the Food Safety and Standards Authority of India, develop science based standards for food and regulate and monitor the manufacture, processing, storage, distribution, sale and import of food so as to ensure the availability of safe and wholesome food for human consumption.

1. Prevention of Food Adulteration Act (PFA, 1954)

One of the early Acts to be promulgated was the Prevention of Food Adulteration Act of 1954, which was in force since June 1, 1955. The objective of this act was to ensure that food articles sold to the consumers are pure and wholesome. The act prohibits the manufacture, sale and distribution of not only adulterated foods but also foods contaminated with microorganisms and toxicants. PFA specifies microbial safety standards for pasteurized milk, milk powder, skimmed milk powder, infant milk food, tomato sauce, jam, malted milk food and aflatoxin levels for groundnut.

The PFA standards and regulations apply equally to domestic and imported products and cover various aspects of food processing and distribution. These include food colours, preservatives, pesticide residues, packaging and labelling and regulation of sales. 'A Central Committee for Food Standards" has been constituted under the Act and has been charged with the function of advising the Central Government on matters relating to the food standards. The state government sets up food testing laboratory and appoints Public Analysts with adequate staff to report on suspected foods.

2. Fruit Products Order (1955)

The fruit and vegetable processing sector is regulated by the Fruit Products Order (FPO), 1955 , which is administered by the Department of Food Processing Industries. The FPO contains specifications and quality control requirements regarding the production and marketing of processed fruits and vegetables, sweetened aerated water, vinegar and synthetic syrups. Packaging fruits and vegetables of a standard below the minimum prescribed standards is an offence, punishable by law. All processing units are required to obtain a licence under the FPO, and periodic inspections are carried out. Processed fruits and vegetable products imported into the country must meet the FPO standards.

3. Meat Products Order (1973)

Regulations for the production of meat products are covered by the Meat Products Order, 1973. The Order:

- Specifies sanitation and hygienic requirements for slaughter houses and manufacture of meat products
- Contains packing, marking and labelling provisions for containers of meat products.
- Defines the permissible quantity of heavy metals, preservatives and insecticide residues in meat products and
- Prevents the use of harmful substances in meat food products.

The Directorate of Marketing and Inspection at the Ministry of Agriculture is the regulatory authority for the order, which is equally applicable to domestic processors and importers of meat products.

4. Livestock Importation Act (1898)

India has established procedures for the importation of livestock under the Livestock Importation Act, 1898. Under the regulations, the import of meat products, eggs and egg powder and milk products require a sanitary import permit from the Department of Animal Husbandry, Dairying and Fisheries at the Ministry of Agriculture.

5. Milk and Milk Products Order (1992)

The production and distribution or supply of milk products is controlled by the Milk and Milk Products Order, 1992. The order sets sanitary requirements for dairies, machinery and premises and includes quality control, certification, packing, marketing and labelling standards for milk and milk products. Standards specified in the order also apply to imported products.

6. Essential Commodities Act (1955)

The main objective of the Act is to regulate the manufacture, commerce and distribution of essential commodities including food to the public at reasonable price.

7. Cold Storage Order (1980)

The cold storage order, 1980, promulgated under the Essential Commodities Act, 1955, has the objective of earning hygienic and proper refrigeration conditions in a cold store regulating the growth of cold storage industry and rendering technical guidance for the scientific preservation of food stuffs in a cold store and prevent exploitation of farmers by cold store owners. Agricultural Marketing Advisor to the Government of India is the licencing officer under this.

8. Weights and Measures Act (1976)

Standards for weights and measures are administered by the Ministry of Consumer Affairs, Food and Public Distribution under the Standards of Weights and Measures Act, 1976 and related rules and notification. All weights or measures must be recorded in metric units and certain commodities can only be packed in specified quantities (weight, measure or number). These include baby and weaning foods, biscuits, bread, butter, coffee, tea, vegetable oils, milk powder, wheat and rice flour.

Bureau of Indian Standards (BIS)

The Bureau of Indian Standards operates Certification Mark Scheme under the BIS Act, 1986. Standards covering more than 450 different food products have been published. Standards are laid for vegetable and fruit products, spices and condiments, animal products and processed foods. Once these standards are accepted, manufacturers whose products conform to these standards are allowed to use BIS label on each unit of their product. The products are checked for quality by the BIS testing laboratories at Delhi, Mumbai, Calcutta, Chennai, Chandigarh and Patna.

मानकः पथप्रदर्शक
Bureau of Indian Standards

Some of the items which require compulsory BIS certification under PFA are natural food colours and food colour preparation, food additives, infant milk foods, milk cereal based weaning foods, milk powder and condensed milk.

The AGMARK Standard

The word "AGMARK" is derived from Agricultural Marketing. The AGMARK standard was set up by the Directorate of Marketing and Inspection of the Government of India by introducing an Agricultural Produce Act in 1937. The word "AGMARK" seal ensures quality and purity. A sample AGMARK seal is given below:

भारत सरकार
GOVERNMENT OF INDIA
AGMARK
एग मार्क

The act defines quality of cereals, spices, oil seeds, oil, butter, ghee, legumes and eggs and provides for the categorisation of commodities into various grades depending

on the degree of purity in each case. The grades incorporated are grades 1,2,3 and 4 or special, good, fair and ordinary.

The Central AGMARK laboratory at Nagpur, continuously carries out research and development work in this field. The “Certificate of Authorization”, is granted only to those in the trade having adequate experience and standing in the market. The process of grading and administering the programme entails some cost hence graded products are priced slightly more. Considering the quality that is assured, that little extra cost is worth paying.

Codex Alimentarius

FAO / WHO Food Standards programme is called Codex Alimentarius. The word Codex Alimentarius means “Food Law” or “Food Code” in Latin is a combined set of standards, codes or practices and other model regulations available for countries to use and apply to food in an international trade.

Consumer Protection Act (1986)

The main objective of this Act is to promote and protect the rights of the consumers, with regard to defective goods, deficiency of services, overcharging or any other unfair trade practices. Complaints can be referred to the District Consumer Redressal Forum. The forum can order the opposite party for removal of the defect, replacement of the goods, return of the prices or charges or order payment of compensation for the loss or damage suffered due to deficiency of service. Appeals can be made to State Commission and then to National Commission.

The Act came into effect first on December 24, 1986 after being passed by the Indian Parliament. It was modified later on and the modifications came into effect on March 15, 2003. The Act makes provisions to include both tangible goods and intangible service purchased from trader or service provider.

Consumer Protection Councils

This Act provides the Central and State Government to create councils at the Centre, State and District levels to promote consumerism.

Consumer Disputes Redressal Agencies

This section of the act provides for the creation of consumer courts. The central government is given the responsibility to create and maintain the National Consumer Disputes Redressal Commission in New Delhi. The state government is given the responsibility to create a State Consumer Disputes Redressal Commission at the state level and a District Consumer Redressal Forum at the district level. World consumer day is celebrated every year on 15th March.

1:4. Sensory Evaluation : Need, qualities of the taste panel members, testing laboratory, conducting test

Need for sensory evaluation: Quality is the ultimate criterion of the desirability of any food product. Food quality can be evaluated by sensory organs and by objective methods. Sensory evaluation consists of judging the quality of food by a panel of judges. The evaluation deals with measuring, analysing and interpreting the qualities of food as they are perceived by senses of sight, taste, touch, size, shape and colour of foods and other characteristics, such as transparency, opaqueness, turbidity, dullness and gloss. Colours of food contribute immeasurably to one's appreciation of them and colour is associated with other attributes for example, the ripeness of fruits is judged by colour and the strength of coffee and tea is judged by the colour of the beverages.

The overall quality of a food depends on the nutritional and other hidden attributes and sensory quality as assessed by means of human sensory organs. Governments in many countries protect the interests of the consumers regarding nutritional and hidden attributes by stringent controls to assure good food quality and enactment of food laws regarding inspection, grading, packaging and labelling of foods.

Definition: When the quality of food product is assessed by means of human sensory organs, the evaluation is said to be sensory. Every time food is eaten a judgment is made. Sensory evaluation is a scientific discipline that applies principles of experimental design and statistical analysis through the use of human senses like sight, smell, taste, touch and hearing for the purpose of evaluating consumer food or products.

Sensory evaluation is one of the simplest analytical tools for monitoring quality control at all stages of food product processing, starting from inspection of incoming raw materials to their finished products.

Importance of sensory evaluation

In sensory evaluation what is to be tested and scientifically evaluated is precisely defined. It helps in the following ways:

i. New product development: To improve the sensory quality of a product by product development and to ensure the inter-batch consistency as well as the product reformulation.

ii. Monitoring competition market:

- To understand how a new variety performs against its competitors.
- To introduce products in the market to attract the consumer perception and sensory characteristics of the products
- To influence product listings (items prepared) by presenting independent research.

iii. Consumer acceptability : To determine the different tastes of consumers and their acceptability.

iv. Quality control : To assist in the determination of the shelf life of the product

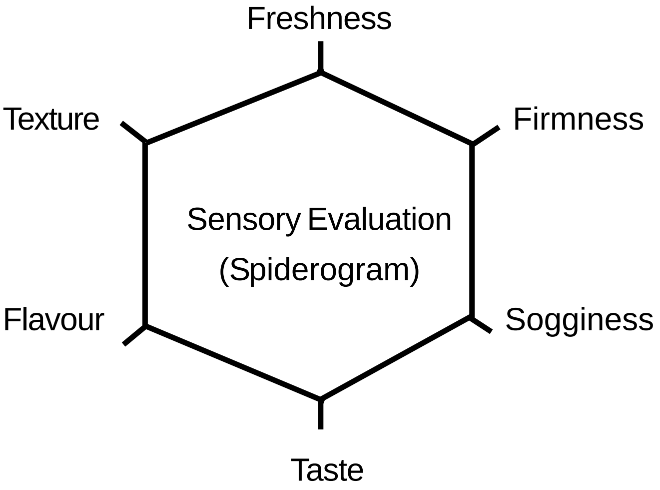
v. Others : To know the storage stability, raw material specification, advertising claims and cost reduction.

Reasons for testing food quality :

- To know the consumer preferences, to discover the qualities of the product to be developed and emphasized.
- To determine whether the quality of flavour has been altered and
- To detect the presence of off-quality. For example to know rancidity in fats and butter.

Sensory Evaluation of a Product

This spiderogram visualizes the parameters of a product and helps to understand where the product lacks behind and thus opening up an opportunity for improving it.



Sensory characteristics of food

1. Appearance : Surface characteristics of food products contribute to the appearance (eg) Fudge with glossy surface is rated high. Interior appearance can also be evaluated (eg) Lumps in pudding or gravy are not desirable and can be judged by the eye. Sight plays a role in the assessment of the lightness of food like bread and idli. Quality of sweet limes can be found out by appearance such as if the skin is thin it is juicy. Infestation with insects in brinjal can be found out by the appearance of black spots on it.

2. Colour : In addition to giving pleasure, the colour of food is associated with other attributes (eg) ripeness of fruits like banana and tomato. Colour is used as an index to the quality of a number of foods. The strength of coffee and tea is judged by the colour of the beverage. Bread toast, dosai and chappathi which are too brown are likely to be rejected in anticipation of scorched bitter taste.

3. Flavour : The flavour of a food has three components like odour, taste and composite sensations known as mouth feel.

i. **Odour :** A substance which produces odour must be volatile and molecules of the substance must come in contact with receptors in the epithelium of the olfactory organ. Aroma is able to penetrate even beyond the visual range as is true in boiling sambar. High temperature tend to volatalize aromatic compounds, cold temperatures inhibit volatilization.

ii. **Taste :** We value food for its taste. Taste sensation which the taste buds register are categorized as sweet, salt, sour or bitter. Taste buds near the tip of the tongue are more sensitive to sweet and salt. Those on the sides to sour and those near the back to bitter. Organic compounds like alcohols, amino acids and aldehydes elicit the sweet sensation. Sugars are the main source of sweetness in food, not all sugars are equally sweet, fructose gives the most intense sweet sensation followed by glucose, maltose etc. The pleasant sensation in eating comes more from odour than from taste.

iii. **Taste interaction :** Food contains a mixture of substances which elicit all four taste sensations. The addition of salt to lime juice, sherbet, lassi and to fruits like guava or apple improves the taste. A pinch of sugar may improve the taste of vegetable soup. Sugar also reduces the sourness of acids and the bitterness of coffee.

iv. **Mouth feel :** Texture and consistency and hotness or burning sensation of pepper can be felt in the mouth. Apart from this, temperature – hot or cold, texture – hard or soft, tenderness, consistency – ice cream may be too hard or too soft, can be found by mouth feel.

v. **Psychological factors :** In addition to colour, odour, taste and mouth feel certain psychological factors contribute to the acceptability of foods. Food is accepted when there is pleasant association.

Testing laboratory : Food testing laboratory consists of five separate units

i. Reception room: Where the panel members meet the person incharge of the laboratory and get acquainted with the type of the samples to be tested.

ii. Sample preparation room: It is a clean, well equipped room for the preparation and serving of sample.

iii. Testing room: This is the place where the actual sensory evaluation of the samples are carried out by the panel members. The entire testing laboratory should be air conditioned, free from noise and extraneous odours.

iv. Light: Whenever samples with difference in colours are tested, coloured electric lights should be used to mask the colour of the samples.

v. Utensils: Stainless steel or glass dishes and cups and plain serving china dishes were the most convenient as utensils.

Qualities of ideal taste panel members:

Human judgement is individual and is not always consistent. Physical and environmental factors may affect one's judgement. The desirable qualities of the panel judges are as follows:

- He should be able to discriminate easily between samples and should be able to distinguish appreciable differences in taste and smell.
- He should have good health, a sick patient cannot judge the food correctly

- He should be experienced in the particular field
- He should have high personal integrity and should not be prejudiced
- He should have interest in sensory analysis of samples and intellectual curiosity
- He should have the ability to concentrate and derive proper conclusions.

Sensory Evaluation Booths

Types of Sensory Tests: Sensory tests fall broadly into two categories:

1. **Analytical or product oriented tests :** These are used to determine differences among products or to measure sensory characteristics.
2. **Affective or consumer oriented tests:** These are used to evaluate the preference, acceptance or degree of liking of food products

   The tests are also grouped into four types as follows:

   A) Difference test

   B) Rating (Quantitative differences) test

   C) Sensitivity test

   D) Descriptive test

The selection of a particular test method will depend on the defined objective of the test, accuracy desired and personnel available for conducting the evaluation.

A) Difference Tests: It includes

1 Paired comparison test

2. Duo - Trio test

1. Paired comparison test:

The panel members receive several pairs of samples. These may be different or the same samples in each pair. Samples are always given in code numbers. Different samples are given in each pair which differ in the intensity of one characteristic e.g. Sweetness, bitterness or rancidity. In each pair the sample with more or less intense taste will have to be picked out.

Model Evaluation Card
Paired Comparison Test

Name : Date :

Product :

You are given one or several pairs of samples. Evaluate any two samples.
Is there any difference between the two samples?

Code no. of pairs	Yes	No
___________________-	___________	___________
___________________-	___________	___________
___________________-	___________	___________
___________________-	___________	___________

Signature

Note : Mention the specified sensory characteristics to be studied (eg) sweetness, texture, flavour or overall quality. Use separate cards for each characteristic.

Source : (For all specimen evaluation cards) Ranganna. S., 1977. A Manual on Analysis of Fruit and Vegetable Products. Tata McGraw Hill Publishing Company Limited, New Delhi.

2. Duo-Trio Test : This test employs three samples, two identical and one different. The panel is first given one of the pair of identical samples as known reference sample R and then the other two successively in random order and asked to match one of these with the first. A positive answer is required even if it is a guess. The chance probability of placing the samples in a certain order is one half.

B) Rating Tests : These tests give more quantitative data than difference tests and can be used for the analysis of more than two samples at the same time.

1. Ranking Test : This test is used to determine how several samples differ on the basis of a single characteristic. A control need to be identified. All samples are presented to panelists simultaneously (including a standard or control if used) with code numbers and are asked to rank all samples according to the intensity of the specified characteristic.

Different points or phrases can be used as yardsticks.

2. Single Sample Test : This test is useful for testing foods that have an after taste or flavour carryover which precludes testing sample at the same session. The panelist is asked to indicate the presence or absence and or intensity of a particular quality characteristic. With trained panelist, the completed analysis of two or more samples evaluated at different times can be compared.

C. Sensitivity Tests: Sensitivity tests are done to assess the ability of an individual to detect different tastes, odours and feel the presence of specific factors like astringency or hotness (pepper). These tests are used to select and train the panel members for evaluating the quality of products containing spices, salt, sugar (eg) tomato ketchup or sauce.

Dilution Test : Dilution tests are designated to establish the smallest amount of an unknown material when it is mixed with the standard product eg. Margarine in butter, dried whole milk in whole milk and so on. The quality of the test material is represented by the dilution number which is the percent of the test material in the mixture of the standard product such that there exists a just identifiable difference in odour and taste between them. The bigger the dilution the better is the quality of the test material.

D. Descriptive flavour profile method: This is both qualitative and quantitative description method for flavour analysis in products containing different taste and odour. For tomato ketchup the flavour profile analysis is given in Table 1.4.

Table 1.4 : Flavour Profile Analysis of Tomato Ketchup

Aroma	Taste	Mouth feel	Texture
Garlic 1 Pepper 2 Onion 3 Cinnamon 2 Cloves 1	Sour tomato 1 Sweet (sugar) 2 Salt 1	Chillies 1	Smoothness 3

The above mentioned sensory tests are used in food industry for different objectives.

Limitations of sensory evaluation

- The results may be highly variable
- People with cold or other health problems temporarily lose their maximum effectiveness.

Questions

PART - A

I. A) Choose the Correct Answer.

1.__________stimuli indicates us that we need to consume food.

a) Hunger b) Flavour c) Sight

2. Perishable foods should be stored at __________________ temperature

a) 40^0 to 55^0F b) 60^0F to 70^0F c) 35^0 to 40^0F

3. _________ resembles mustard and are used to mix with mustard seeds.

a) Pepper b) Argemone c) Sesame

4. _________ are pesticide residues, tin from can, droppings of rodents and larvae in foods

a) Incidental adulterants b) Intentional adulterants c) Other adulterants

5. _________ is used as an adulterant in Turmeric

a) Food colour b) Metanil yellow c) Food flavour

6. _________ is a toxic element which brings pathological changes in the kidney, liver and arteries

a) Lead b) Chromate c) Mercury

7. Foods stored in galvanised ironware causes ____________

a) Dizziness b) Vomiting c)Dizziness and vomitting

8. Ascaris lumbricoides causes ____________

a) Ascariasis b) Amoebiasis c) Dysentery

9. Nitrates and nitrites cause cancer of ____________

a) Liver b) Bone c) Blood

10. The word Agmark means ____________

a) Agricultural marking b) Agricultural marketing c) Agent marketing

11. Codex Alimentarius is a ____________

a) Food law b) Food market c) Food regulation

12. ______________is the ultimate criterion of the desirability of any food product

a) Quality b) Type c) Variety

13. ______________promote and protect the rights of the consumers

a) Food Safety and Standard Act b) PFA Act c)Consumer Protection Act

14. Colour is used as an index to the __________of a fruit.

a) Ripeness b) Acidity c) Flavour

15. ______________ is the place where the actual sensory evaluation of the samples are carried out by the panel members

a) Testing room b) Sample preparation room c) Reception room

B) Answer in one or two sentences

1. What are sensory factors?
2. Mention about formal buying.
3. Define labelling.
4. What are the types of storage?
5. Define food adulteration.
6. Expand PFA.
7. Define sensory evaluation.
8. List three components of flavour
9. What is appetite?
10. What is open market?

PART - B

II. Answer in five lines. Answer any 10 questions

1. Write about the psychological influences on food.
2. List the qualities of a food buyer.
3. Write short notes on new adulterants.
4. How will you prevent incidental poisoning?
5. List the eight laws passed by the Food Safety and Standards Act.
6. What is spiderogram? Draw the diagram.
7. Write about Duo-Trio test.
8. How metallic contamination causes food adulteration?
9. How packing causes health hazards?
10. Write the need for sensory evaluation.

PART - C

III. Answer in one page.

1. Enumerate the factors to be considered while purchasing food.
2. Explain the poison chain.
3. Summarise the qualities of ideal taste panel members.
4. Explain paired comparison test.
5. Describe frozen storage.

PART - D

IV. Answer in Detail

1. Explain in detail about the internal and external factors influencing food choices and selection.
2. Tabulate any 10 International Adulterants and method of detection.
3. Describe the sensory characteristics of food.
4. Explain Duo-Trio test, Ranking test, Single simple test and Dilution test.
5. Discuss the different methods of purchasing foods.

2. MATERNAL AND INFANT NUTRITION

2.1. Growth and development of foetus, food and nutrient requirements during pregnancy, complications during pregnancy, MMR, IMR.

Adequate nutrition before and during pregnancy has greater potential for a long term health impact than it does at any other time. Maternal health is influenced by various genetic, social and economic factors, infections and environmental conditions, many of which may affect the foetal growth. A woman who has been well nourished before conception begins her pregnancy with reserves of several nutrients, so that the needs of the growing foetus can be met without affecting her health. Infants who are well nourished in the womb, have an enhanced chance of entering life in good physical and mental health. A woman whose diet is adequate before pregnancy is usually able to bear a full term viable infant, without extensive modifications in her diet. Mother's diet should provide adequate nutrients so that maternal stores do not get depleted and produce sufficient milk to nourish her child after birth.

Growth and development of foetus

Maternal nutritional needs are based on the first order of events on the great physiologic demands of foetal growth and development. Thus, an understanding of these events is an important point for assessing the nutritional needs of a pregnant mother. The rapid growth and development of the embryo and foetus follows three distinct phases of developing form and structure. Optimal nutritional reserves and continuing support are essential at each stage. These phases of foetal development include the period of implantation, period of differentiation of major organs and tissues and the period of intensive final growth.

1. Period of implantation (First 2 weeks):

The fertilized ovum attaches itself to the uterine wall in the uterus and develops into a sphere which has an inner and outer layer of cells. Foetal membranes such as amnion and chorion help to protect, nourish and support the foetus. The amnion forms a sac around the foetus filled with amniotic fluid. Outer layer cells contribute to the formation of placenta which will nourish the foetus, acquire respiration and eliminate wastes. These special cells develop within 9 to 10 days of fertilization of the ovum.

2. Period of differentiation of major organs and tissues (2 to 8 weeks) :

During the second phase of foetal development, rapid dramatic changes take place in the developing embryo. The entire nervous system, gastrointestinal tract, skeleton and connective tissues are formed. By the seventh week, the body has begun to take form and the embryo can be identified as human. Such rapid development of cells in these early weeks demands an abundant maternal nutrient base.

3. Period of intensive growth (8 weeks to term):

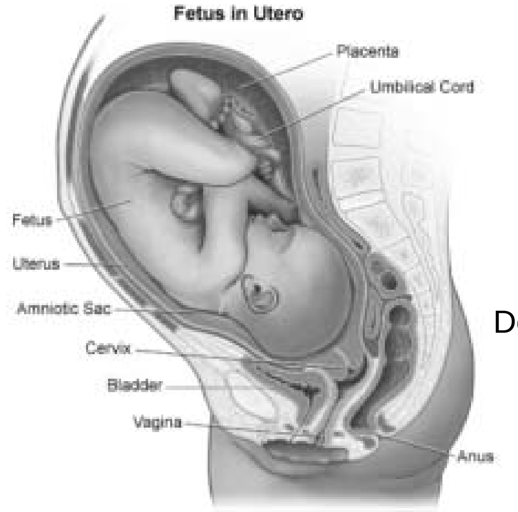
From the eighth week onwards the changes are less dramatic but equally vital to the life of the developing foetus. The mother's body undergoes vast nutritional reconditioning

to support pregnancy and additional reserves are laid down to meet the demands of approaching labour and lactation.

Physiological changes during pregnancy

- Blood volume expands by 50 per cent resulting in a decrease in haemoglobin levels, blood glucose values, protein and water soluble vitamins levels
- Gastrointestinal motility diminishes to allow for increased absorption of nutrients. This often results in constipation, regurgitation and heart burns
- Increased glomerular filtration rate in the kidneys and the ability to excrete water is lowered
- Placenta is the principal site of production for several hormones responsible for regulation of foetal growth and development of tissues. It is also involved in exchange of nutrients, oxygen and waste products
- Due to foetal growth, BMR increases by about 5-12 per cent.

Figure 2.1 shows the relationship between maternal and foetal nutrition



Fetus in Uterus

Inadequate food intake and poor nutrient utilization

↓

Maternal malnutrition

↓

Increased blood volume

↓

Inadequate increase in cardiac output

↓

Decreased blood and nutrient supply to the foetus

↓

Reduced placental size

↓

Reduced nutrient transfer

↓

Foetal growth retardation

Fig. 2.1: Relationship between maternal and foetal nutrition

Nutrition during pregnancy

Gestation period is a rapid growth period. Growth of the foetus and other developments that take place to facilitate its maintenance throughout pregnancy and delivery of the child involve an increase in the nutritional requirements of the pregnant woman. Exchange of nutrients and wastes take place in the placenta much as they do in the gastrointestinal tract; oxygen and nutrients pass from mother to the foetus, carbon-di-oxide and metabolic wastes pass in the opposite direction. Water and fat soluble vitamins

diffuse to the foetal circulation. Other nutrients such as aminoacids, glucose, water soluble vitamins and minerals such as calcium, sodium and iron are actively transported.

The increase in the nutritional requirements of a pregnant woman can be attributed to:

- Rapid growth of the foetus
- Development of the placenta
- Enlargement of maternal tissues, namely the breast and uterine tissues
- Increase in maternal circulating blood volume
- Formation of amniotic fluid
- Formation of storage reserves of nutrients
- Mineralisation of the skeletal and bone structure of the foetus as well as tooth buds.

Nutritional requirements

Increase in nutritional requirements depend on the nature of metabolic changes of pregnancy and the nutrition reserves of the mother. The RDA of the expectant mother is given in Table 2.1.

Table 2.1: ICMR Recommended Dietary Allowances for an Expectant Mother

Nutrients	Normal Adult woman	Additional Allowances	Expectant Mother
Energy (kcal)			
Sedentary	1900	+300	2200
Moderate	2230		2530
Heavy	2850		3150
Protein (g)	55	+23	78
Fat (g)	20	+10	30
Calcium (mg)	600	+600	1200
Iron (mg)	21	+14	35
Vitamin A			
Beta carotene (mcg)	4800	+1600	6400
Thiamine (mg)			
Sedentary	1.0	+0.2	1.2
Moderate	1.1		1.3
Heavy	1.4		1.6
Riboflavin (mg)			
Sedentary	1.1	+0.2	1.4
Moderate	1.3		1.6
Heavy	1.7		2.0
Niacin (mg)			
Sedentary	12		14
Moderate	14	+2	16
Heavy	16		18
Pyridoxine (mg)	2.0	+0.5	2.5
Ascorbic acid (mg)	40	+20	60
Folic acid (mcg)	200	+300	500
Vitamin B_{12} (mcg)	1	+0.2	1.2

Source: Nutrient Requirements and Recommended Dietary Allowances for Indians, ICMR, 2010

Energy

Energy requirement during pregnancy is increased because of the following changes:

- growth and physical activity of the foetus
- growth of the placenta
- normal increase in the maternal body size
- steady rise in BMR and
- additional work involved in carrying the weight of the foetus and external maternal tissues

For an Indian woman of 55 kg, the total energy cost of pregnancy is 80,000 kcals. Of this 36,000 kcals are deposited as fat which is utilized subsequently during lactation. Considering this, an additional intake of 300 kcals per day during pregnancy is recommended.

Protein

An additional protein intake of23g/day i.e. a total of 78 g is recommended. The additional protein is essential for

- growth of the foetus
- development of placenta
- enlargement of uterus and mammary gland
- increased maternal blood volume and
- formation of amniotic fluid

Fat

ICMR expert committee has suggested an intake of 30g/day of visible fat during pregnancy. This is based on studies indicating that linoleic acid requirements during this stage is 4 to 5 per cent of total energy. An intake of 30g of visible fat has been suggested to meet the essential fatty acid needs.

Calcium

The calcium requirement of an adult woman is 600mg/day. During pregnancy the need increases to 600mg/day. The additional calcium is needed for the growth and development of bones as well as calcification of foetal bones and teeth and also for the protection of calcium resources of the mother to meet the high demand of calcium during lactation. The amount of calcium deposited in the fully grown foetus is around 30g. Therefore an intake of 1200mg calcium per day can meet the needs of the mother. Inadequate intake of calcium results in the mobilization of calcium from mother's bones resulting in demineralization of maternal bones leading to osteoporosis.

Iron

The requirement of iron increases from 21mg/day to 35 mg/day during pregnancy. The increased requirement of 14mg/day is due to

- Expansion of maternal tissues including red cell mass, iron content of placenta and blood loss during parturition.
- To build the iron stores in foetal liver to last for atleast 4-6 months after birth. This is because the baby's first food that is breast milk is deficient in iron. Generally infants are born with a high level of iron, 18-22mg/100ml.

Zinc

Deficiency of zinc adversely affects the outcome of pregnancy. Apart from being a component of insulin and enzyme systems, it also participates in the synthesis of DNA and RNA playing a significant role in reproduction. Hence zinc deficiency leads to foetal mortality, foetal malformations and reduced intra uterine growth rate. The risk of low birth weight (LBW) babies doubles and preterm delivery increases three times due to low zinc intake during pregnancy.

Sodium

Normal adult women's requirement of sodium should be maintained to prevent any disorders or deficiencies.

Vitamins:

The normal requirement of vitamin A in the form of beta carotene is 4800 μg/day. An additional dietary allowance of 1600 μg/day during pregnancy is suggested.

In the B complex group, folic acid supplementation may be required to protect against megaloblastic anaemia. The other B vitamins, especially thiamine, riboflavin and niacin are also required in larger quantities since they are the co-enzymes in a number of metabolic activities, especially energy production and in the functioning of muscle and nerve tissues.

Vitamin C, besides its normal functions, is involved in the development of connective tissue and vascular system as well as in the absorption of iron. It may be obtained by eating fresh fruits and drinking fresh fruit juices.

The need for calcium and phosphorus is increased, hence the requirement of vitamin D also should be increased because it is involved in the absorption and utilization of calcium. As plenty of sunshine is available in our country the requirement of vitamin D can be easily met through its biosynthesis in the skin.

The food requirements of an expectant woman doing sedentary work is given in Table 2.2.

Table :2.2 Food Requirements for a Pregnant Woman (Sedentary work)

S.No.	Food group	Quantity (g)
1.	Cereals and millets	300
2.	Pulses	60
3.	Milk (ml)	500
4.	Roots and tubers	100
5.	Green leafy vegetables	150
6.	Other vegetables	100
7.	Fruits	200
8.	Sugar	20
9.	Fats and Oils (visible)	30

For non-vegetarians 30g of pulses can be substituted with 50g of meat/chicken/fish/egg.

Source : Dietary Guidelines for Indians – A Manual, National Institute of Nutrition, ICMR, Hyderabad, India, 2005.

Diet during pregnancy

The basic principle of meal planning remains the same, but since the nutritional requirements increase during pregnancy, emphasis should be in including nutrient dense foods ie. foods that give most nutrients per calorie be consumed. Pregnancy is perhaps the most effective time to attempt nutrition education.

Usually a daily diet containing three cups of milk or its equivalent, two servings of meat, fish, poultry, eggs, or a source of complete protein, dark or yellow vegetables and a generous serving of citrus fruits will provide a nutritionally adequate diet. Between the first trimester 75 per cent of women suffer from nausea which in turn affects their appetite. The consumption of small and frequent meals at regular intervals are helpful to many women. The mother should consume extra food to meet increased requirements. Her feeding pattern should be 5-6 meals a day.

Food stuffs like whole grain cereals, rice flakes, puffed rice, dried fruits, green leafy vegetables, eggs, enriched cereals, organ meats can be given to meet additional iron needs. Foods rich in dietary fibre like fresh fruits, whole grain cereals with plenty of fluids need to be included. This is to get rid of constipation which is a common problem during pregnancy.

A model diet plan and some suggested foods during pregnancy are given in Table 2.3 and 2.4.

Table : 2.3 Model Diet Plan for an Expectant Woman

Early morning	Tea 1 glass
Breakfast	Idli - 3 medium size Coconut chutney / Sambar - ½ cup Orange or banana - 1
Midmorning	Lime juice - 1 glass
Lunch	Chappathi 4 or Rice 2 cups Ladies finger sambar - ½ cup Fish curry or chicken curry - ½ cup Green leafy vegetable poriyal -1½ cup Curd - 1 cup, cucumber salad ½ cup
Evening	Milk-1 glass, Cheese sandwich-2 (or) roasted peanuts - 2 tbsp.
Dinner	Chappathi-3 or rice 1½ cup, mixed vegetable curry - 1 cup, rasam - 1 cup, curd -1 cup, fruit - 1
Bed time	Milk - 1 glass

Table : 2.4 Some suggested foods during pregnancy

Foods	Reason
Dairy products like milk, curd, khova, yogurt, cheese and paneer	To meet protein, calcium and vitamin D requirements and prevent muscle cramps
Banana, green leafy vegetables, whole grain cereals	Natural laxatives and prevent constipation
Fruit salad	Appetising and provide nutrients and fibre
Omlette, boiled egg, scrambled egg, liver curry	Good quality protein and iron
Rice flakes upma, puffed rice ball	Good source of iron and easily digestible
Green gram sundal, pakoda, bread pudding, carrot halwa	Nutrient dense foods to meet increased requirements
Pickles, rasam, sour foods	These foods may give relief from nausea

Complications during pregnancy

1. Nausea and vomiting : Generally, it is mild and occurs during early pregnancy and is commonly called "morning sickness" as it tends to occur early in the day but may occur at any time and can be improved by frequent small meals. If the condition develops to hyperemesis gravidarum characterized by a severe prolonged persistent vomiting, then careful oral feeding and sometimes parenteral nutrition may be essential.

2. Constipation : The pressure of the enlarging uterus on the lower portion of the intestine, in addition to the muscle relaxant effect of placental hormones on the gastro intestinal tract and physical inactivity may make elimination difficult. Increased fluid intake and use of natural laxative foods such as whole grains, dried fruits and other fruits, vegetables, juices usually induce regularity. Hence, other laxatives should be avoided. Regular habits of exercise and sleep are essential for proper elimination.

3. Heart Burn : Some pregnant women may complain of "feeling of fullness" or "heart burn" during later half of pregnancy. This is usually due to the pressure of the enlarging uterus crowding the stomach which in combination with the relaxation of the oesophage sphincter may cause regurgitation of stomach contents into the oesophagus. This may cause burning sensation due to gastric acid mixed with the food mass. This feeling of fullness occurring due to gastric pressure, lack of space or gas formation can be avoided by taking small frequent meals and drinking fluids in between meals.

4. Oedema and leg cramps : Mild oedema due to physiological changes is usually present in the extremities in the third trimester. This may be caused by the pressure of the enlarging uterus on the veins returning fluid from the legs. This oedema does not require sodium restriction or other dietary changes. Also the common occurrence of cramps during night manifested by sudden contractions of the muscle is thought to be related to decline in the serum calcium levels, which in turn is related to calcium imbalance.

5. Pica : Pica refers to the compulsion for persistent ingestion of unsuitable substances that have little or no nutritional value like starch, clay and chalk.

6. Anaemia : A pregnant woman is labelled anaemic if the blood haemoglobin is less than 10g/100ml from the 28th week onwards. A significant fall in birth weight due to increase in prematurity rate and intrauterine growth retardation can occur if the haemoglobin level goes below 8g/100ml. The demand for folate is increased due to increased cellular proliferation. Megaloblastic anaemia due to folate deficiency results in intensified nausea, vomiting and aneroxia.

7. Pregnancy Induced Hypertension (PIH) : PIH is a syndrome characterized by hypertension, proteinemia and oedema, convulsions or coma. This condition develops in the third trimester. Pre-eclampsia and eclampsia are the two stages which differ with the degree of symptoms, eclampsia denoting a severe stage. Oedema of pre-eclampsia may be associated with dizziness, head ache, visual disturbances, facial oedema, anorexia, nausea and vomiting. In severe state of eclampsia convulsions occur near the time of delivery. Optimal nutrition is the fundamental aspect of treatment.

8. Gestational diabetes mellitus: Due to increased blood volume and corresponding metabolite load some glucose is excreted in urine. Most of these conditions revert to normal glucose tolerance after delivery. The incidence of pre-eclampsia is high in pregnant women with diabetes mellitus.

9. Ill effects of alcohol, caffeine, drugs and tobacco : Alcohol consumption during pregnancy leads to abnormal physical and mental development of foetus is defined as Foetal Alcoholic Syndrome (FAS). Infants with FAS are premature and have low birth weight. They have distinct physical characteristics like small head, short eye slits which make the eyes looking far apart, thin upper lip and high evidence of central nervous system dysfunction. Caffeine can cross the placenta and enter foetal circulation. Pregnant women, who are heavy coffee drinkers are considered at risk for miscarriages and premature deliveries.

Drugs used during pregnancy, whether medicinal or recreational leads to numerous problems. Recreational drugs like heroin, LSD, lead to poor prenatal weight, short or prolonged labour and other perinatal problems. Self use of medicinal drugs especially during early stages of pregnancy may lead to malformation of the foetus.

Smoking during pregnancy results in placental abnormalities and foetal damage including prematurity and low birth weight. This is mainly due to reduced blood flow, which affects the oxygen and nutrient transport through the placenta. Too early (teenage pregnancy) or too late (35 years and above) or too close (less than two years spacing) are not safe or conducive both to the health of the mother and infant.

Maternal Mortality Rate and Infant Mortality Rate

Maternal mortality is defined as the death of mothers from ‘Puerperal causes due to complications of pregnancy and child birth. Complications of pregnancy such as toxaemia of pregnancy and premature separation of placenta lead to the death of mothers. At the

time of birth also, mothers die due to difficulty births. Large number of maternal deaths can be prevented if proper attention is given to the causes that lead to maternal deaths.

Maternal Mortality Rate (MMR)

UNICEF defines Maternal Mortality Rate as the annual number of deaths of women per 1,00,000 live births due to puerperal causes. The formula for the calculation of MMR is:

$$\text{MMR} = \frac{\text{Annual number of deaths of mothers}}{\text{Annual number of live births}} \times 1,00,000$$

MMR is an index to determine the health status of a country. It is an internationally recognised index.

The MMR of different countries in the year 2006 is as follows:

Country	***MMR***
Ethiopia	870
India	540
Indonesia	310
Sri Lanka	43
France	10
USA	8
UK	7

It is obvious that MMR is less in developed countries whereas the MMR in India is the highest, next to Ethiopia, an African country.

Classification of Maternal Deaths

Maternal deaths are classified into two groups.

a) Direct Obstetric deaths: These are deaths resulting from complications of pregnancy and child birth.

b) Indirect deaths: These are deaths resulting from previously existing diseases that developed during pregnancy. These are not due to obstetric causes, but are aggravated by the physiological condition of pregnancy.

Causes for Maternal Mortality

The causes for maternal mortality may be broadly divided into medical obstetric causes and social causes.

I. Medical causes: These refer to problems related to child birth or other causes.

a) Obstetric causes: Obstetric causes refer to causes related to child birth. These include toxaemia of pregnancy, haemorrhage (bleeding), sepsis (septic condition), anaesthesia, transfusion reaction, shocks and accidents.

b) Non-obstetric causes: Anaemia and cardiac, renal, hepatic, metabolic and infectious diseases and accidents are the non-obstetric causes. Though these causes are not directly

related to pregnancy or child birth, these conditions during pregnancy may lead to the death of the mother.

II. Social causes: Besides medical causes, a number of social factors are responsible for the high MMR in our country. They are:

a) Poverty: Because of very poor economic conditions, lot of women prefer to have home delivery. Under unsanitary conditions, many women develop septic conditions which lead to their death.

b) Illiteracy: Due to illiteracy women do not know how to take adequate care of themselves during pregnancy and child birth which lead to maternal deaths.

c) Ignorance and prejudices: Though educated, many women have a number of prejudices against visiting hospital for medical check up and having delivery at hospitals. They go to hospitals only when the condition becomes very critical.

d) Malnutrition: Nearly 50 per cent of our people are below the poverty line. Many mothers are not in a position to take nutritious food. Malnutrition causes anaemia which is one of the causes of maternal mortality.

e) Large family size: It limits the chances of better care and too close pregnancies make mothers weak and prone to death.

f) Age at child birth: This is another important factor. When the mother is too young or when she is below 18 years or above 35 years the chances of mortality are more.

g) Delivery by untrained 'Dai": 'Dai' is a traditional birth attendant. These birth attendants, when conduct delivery in unhygienic conditions, this may lead to sepsis in the mother and ultimately death of the mother. Lack of periodical medical check-up is another important cause leading to maternal mortality.

h) Poor environmental sanitation: It leads to tetanus in the mother. In remote villages, maternity facilities are inadequate. The Primary Health Centre and Sub Centre may not be near these villages. Non-availability of help at critical states of delivery may lead to the death of the mother.

Prevention of Maternal Mortality

- Maternal deaths can be prevented if the causes are averted as much as possible.
- Proper pre-natal care will certainly help. Mothers should be advised to visit health centres for regular medical check-up. Doctors can diagnose defects and treatment can be given. Toxaemia of pregnancy, albuminurea, high blood pressure, etc. can be diagnosed and treated at the appropriate time.
- Hospital deliveries help in minimizing death due to complications of birth. If home delivery is to be conducted, it is better to be conducted by a trained 'dai' (traditional birth attendant). Giving training to local 'dais' in aseptic methods of delivery is very much essential.
- Mothers should be advised to space their pregnancies.

- The problem of malnutrition in the mother should be tackled at the community level, may be educated, so that, they know how to get nutritious food at low cost. The programmes like Integrated Child Development Services will go a long way in preventing maternal deaths.
- Nutrition and health education must be given to people by hospitals and Home Science Colleges.
- Poverty is the major cause. If tackeld satisfactorily, it will reduce MMR considerably.

Infant Mortality

"Healthy children make healthy community"

No community can sustain without its children, as children are the future of the community. It is a matter of serious concern that a large number of infants die in developing countries due to inadequate care. This condition of deaths of infants below one year is referred to as Infant Mortality. Death of infants during the first 15 days is known as Neo-natal mortality. Death of infants after the first 15 days is known as post neo-natal mortality.

Infant mortality rate (IMR)

Infant mortaility is usually stated satistically as Infant Mortality Rate (IMR). Infant mortality rate is defined as the number of infant deaths per 1,000 live births in one year. Infants are babies below one year of age. The formula for calculation of IMR is

$$\text{IMR} = \frac{\text{Annual number of deaths of babies under one year}}{\text{Total live births in a year}} \times 1000$$

Infant mortality in selected countries during 2006:

Country	IMR
Engalnd	5.08
USA	6.43
New Zealand	5.76
France	4.21
Sri Lanka	13.97
India	54.63
Ethiopia	93.62

Regarding Infant Mortality Rate also India stands highest next to Ethiopia.

Causes of Infant Mortality

There are two groups of causes, namely, medical and social.

I. Medical causes

a) Immaturity: When the baby is born before full term, its ability to adjust is very much less.

b) Birth injury and difficult labour: These may result in septic condition and asphyxiation leading to death.

c) Congenital anomalies: They are anomalies found at the time of birth itself, like heart being outside the body, being born with two heads, etc.

d) Conditions of placenta and cord: Premature placental separation cuts off oxygen supply. The cord may constrict the neck and this may lead to death.

e) Enteritis and other diarrhoeal diseases: Soon after birth, unhygienic handling and feeding of the baby may cause diarrhoea which if not treated properly, may lead to death. Diarrhoea is the greatest killer of children.

f) Acute respiratory infection: Respiratory infections make breathing difficult and the baby may die due to lack of oxygen.

g) Communicable diseases (Whooping cough, diphtheria, tetanus, tuberculosis, etc). When infants are not immunized against these diseases, there are chances for babies to be affected by these diseases.

h) Malnutrition: Severe malnutrition leads to wasting diseases like Marasmus and Kwashiorkor. If not treated, it may be fatal.

i) Accidents: Household accidents like swallowing medicines, pulling live wire, heavy objects falling on head, etc., may be fatal.

Social causes: Besides these direct causes, the following social causes are also responsible for Infant mortality.

a) Age of mother: It is found that there is a relationship between the age of the mother and infant mortality. Mortality is more when mothers are too young or too old.

b) Interval between births: Too close births lead to inadequate care and attention which make the child weak and susceptible to diseases.

c) Family size: When the family size is large, the attention and care of children will be minimal in families which are poor.

d) Poor socio-economic status: Nutritional, health and other care will be minimal in families which are poor.

e) Ignorance of scientific child care: Not immunizing the baby at proper time may lead to fatal diseases like diphtheria.

f) Birth aided by traditional birth attendant: If the delivery care practices adopted by local 'Dais' are unhygienic they may lead to sepsis of umbilical cord and death of infants.

g) Bad enviromental sanitation: Poor sanitary facilities spread harmful germs easily.

h) Lack of trained personnel: Emergencies in difficult birth must be handled by trained medical personnel. Non-availability of such personnel may lead to infant deaths.

Prevention of Infant Mortality

The high incidence of infant mortality may be brought down by the following strategies:

i. Studies have proved that when pre-natal care of the mother is adequate, infant mortality can be prevented. Even after child birth care is very important. Infants should be protected from cold and communicable diseases.

Polio Drops

ii. Immunizing babies in the first year of their life will help in preventing fatal disease like diphtheria and tuberculosis.

iii. Breast feeding the baby for a minimum period of one year will help to reduce mortality to a large extent.

iv. Giving supplementary foods in addition to mother's milk is an important measure in reducing infant mortality. Mothers may be taught simple household recipes for preparing supplementary foods.

v. Diarrhoea is the largest killer of infants. Learning the method of preparation of Oral Rehydration Solution by mothers will be very much helpful in preventing death due to diarrhoea. This is prepared by adding one pinch of salt and four pinches of sugar to a glass of boiled water.

vi. Child marriages must be discouraged because neo-natal deaths are common in mothers who give birth at a very young age.

vii. Mothers should be advised to space their child birth. They should be advised to space the next birth by at least three years.

viii. Also, mothers must be advised to limit their family size. Too large a family with accompanying poverty is a cause for infant mortality.

ix. Mothers must be encouraged to have their deliveries in a hospital.

x. Health education and nutrition education by health authorities and voluntary agencies must be given to rural mothers.

2.2. Lactation

Adequate nutrition for the mother during lactation is also of vital importance as the infant is dependent on mother's milk for its nutrition for the first few months of life. As the mother has to nourish the fully developed and rapidly growing infant, she needs extra nutrients to meet the baby's increasing needs in addition to her own requirements. A satisfactory diet during pregnancy will ensure a good store of nutrients or satisfactory breast feeding. Inadequate nutrition during lactation is reflected on both the quality and quantity of milk secreted.

Factors affecting the volume and composition of breast milk

Maternal nutritional status : Fat and energy concentration in milk are significantly related to fat stores.

Supplementary feeding : No significant effect of supplementary feeding on the production of milk

Infant demand : Sucking stimulates the release of hormones that stimulate milk production

Undernourished mothers : They produce less quantity but same quality of milk

Nutrient content : Lactose, protein, calcium, iron, copper and fluorine content of milk is independent of the mother's diet.

Minerals and B Vitamins : Selenium, iodine and B vitamins content of milk is dependent on mother's diet.

Genetics : Lactational capacity is a function of genetic heritage.

Variation in quantity and quality : Maternal physical activity, the thermic effect of food or maternal and infant illness may affect the amount and content of milk.

Fluid intake : Milk production may also be affected by the inadequate fluid intake by mothers.

Lactating mother's nutritional requirements should meet

i. her own daily needs
ii. provide enough nutrients for the growing infant and
iii. furnish energy for the mechanics of breast milk production

Composition of breast milk

Soon after delivery small quantities of thick, yellowish, viscous liquid called colostrum is secreted which is rich in antibodies and vitamin A. This should be given to the baby and not discarded. After a few days of lactation the mother secretes larger amounts of less viscous and whitish milk known as “mature milk” which is more or less nutritionally, a complete food. A healthy mother secretes 850 ml of milk daily for which her nutritional needs are increased enormously.

Table 2.5 gives the composition of mother's milk.

Table 2.5: Composition of Mother's Milk

Nutrients	Quantity / 100 ml
Energy	65 kcal
Protein	1.1 g
Carbohydrate	7.4 g
Fat	3.4 g
Calcium	28 mg
Iron	Negligible
Vitamin A - (Retinol)	137 mcg
Thiamine	0.02 mg
Riboflavin	0.02 mg
Vitamin C	3 mg

Nutrient needs during lactation

ICMR nutrient recommendations for a lactating mother is based on the composition of breast milk and the fact that 850ml of milk is produced daily. However the milk secretion continues to increase in the early periods of lactation upto six months and then gradually decreases. Therefore the nutrient requirements are given for the periods in lactation i.e., 0-6 months and 6-12 months. The ICMR (2010) RDA for a lactating mother is given in Table 2.6.

Table 2.6: ICMR Recommended Dietary Allowances for a Lactating Mother

Nutrients	0-6 months	6-12 months
Energy (kcal)		
Sedentary	1900 + 600	1900 + 520
Moderate	2230 + 600	2230 + 520
Heavy	2850 + 600	2850 +520
Protein (g)	55 + 23	55 + 13
Fat (g)	30	30
Calcium (mg)	1200	1200
Iron (mg)	21	21
Beta carotene (mcg)	7600	7600
Thiamine (mg)		
Sedentary	1.0 + 0.3	1.0 + 0.2
Moderate	1.1 + 0.3	1.1 + 0.2
Heavy	1.4 + 0.3	1.4 + 0.2
Riboflavin (mg)		
Sedentary	1.1 + 0.4	1.1 + 0.3
Moderate	1.3 + 0.4	1.3 + 0.3
Heavy	1.7 + 0.4	1.7 + 0.3
Niacin (mg)		
Sedentary	12 + 4	12 + 3
Moderate	14 + 4	14 + 3
Heavy	16 + 4	16 + 3
Pyridoxine (mg)	2.5	2.5
Ascorbic acid (mg)	80	80
Folic acid (mcg)	300	300
Vitamin B_{12} (mcg)	1.5	1.5

Source: Nutrient Requirements and Recommended Dietary Allowances for Indians, ICMR, 2010

Energy

The lactating mother requires additional energy for the production of milk secreted, its energy content and the efficiency of conversion of food energy to milk energy. The additional allowance recommended during six months of lactation is 600 kcal / day Most Indian mothers continue to lactate even after six months but the milk production is reduced. Hence, ICMR has recommended an additional allowance of 520 kcal/day for the period from 6-12 months of lactation.

Protein

For the production of milk, protein requirement also increases, as the produced milk contains 1.15g of protein / 100ml. The recommended additional protein intake during lactation is 23g/day for 0-6 months and 13g per day for 6-12 months.

Fat

ICMR has suggested an intake of 30g of visible fat per day. Although the total fat in breast milk is not influenced by the mother's diet, the composition of milk fat does. The fat also provides energy density to meet the higher energy requirement during lactation.

Calcium

Mother's milk contains 30-40 mg of calcium per 100 ml. Since about 850 ml of milk is produced, around 300 mg of calcium is secreted through milk per day. Therefore the additional intake of calcium is essential to enable the retention of 300mg of extra calcium daily. Since the dietary calcium retention in lactating women is 60 per cent, ICMR has recommended 1200 mg calcium per day for a lactating mother.

Iron

The iron requirement during lactation remains same as adult women of 30mg/day. The baby is born with relatively larger reserve of iron since milk is not a good source of iron.

Vitamins

ICMR recommends for a lactating mother 7600µg of beta carotene per day which is more than that for a pregnant women. The increase in vitamin C requirement indicated during pregnancy continues during lactation. The requirement of vitamin A and B complex vitamins, especially riboflavin and niacin is also increased as they are secreted into milk. In a lactating women blood folate levels drop constantly, so an additional allowance of 100µg of folate could be provided during lactation. If the diet meets the requirement of protein and calcium the requirement of riboflavin would be met. Milk is not only a good source of calcium but also a good source of riboflavin.

Fluid

An increased intake of fluids is necessary for adequate milk production, since milk is a fluid tissue. Water and beverages such as juices, tea, coffee and milk all add to the fluid, necessary to produce milk.

Diet during lactation

A lactating mother requires not only large quantities of body building and protective foods but also additional energy yielding foods to facilitate the secretion of breast milk.

- Nutritional requirements are maximum during lactation compared to any other age group in a woman's life hence the diet should be balanced and meet the requirement. Number of meals can be increased.
- Sucking is the best lactagogue. The diet can include lactagogues which stimulate the production of milk. Garlic, milk and almonds are considered to increase the milk production. Some mothers also believe that foods of animal origin like goats meat and fish also increase milk secretion.
- The choice of food is wide during lactation. No food need to be restricted except spicy and strong flavoured foods which might impart flavour to milk that may be repulsive to the baby and that may cause gastric distress to the mother.
- Almost all medicines taken during lactation are absorbed into mothers blood and are secreted in the milk. Hence medicines must be avoided during lactation or taken under strict medical supervision.

Table 2.7 shows the food requirements for a lactating mother doing sedentary activity. A model diet plan and suggested foor preparations for a lactating mothers is given in Table 2.8 and 2.9.

Table 2.7: Food Requirements of a Nursing Mother doing Sedentary Work

S.No.	Food group	Quantity (g)
1.	Cereals and millets	330
2.	Pulses	90
3.	Milk (ml)	500
4.	Roots and tubers	100
5.	Green leafy vegetables	150
6.	Other vegetables	100
7.	Fruits	200
8.	Sugar	20
9.	Fats and oils	30

Note: For non-vegetarians 30g of pulses can be substituted with 50g of meat/chicken/fish/egg

Galactogogues

Galactogogues are foods that help to produce more milk. Garlic, milk and almonds are considered to increase milk production. Studies carried out on nursing mothers have revealed that extra amounts of body building foods like fish and mutton increase the secretion of breast milk. Lactating mothers are also given special preparations containing ajwain and fenugreek seeds which supply iron, protein, calcium and B-complex vitamins.

Table 2.8: A Model Diet Plan for a Lactating Mother

Early morning	Coffee / tea - 1 glass
Breakfast	Chappathi - 3, dhal - ½ cup or Idli - 4, Tomato chutney - ½ cup, Orange - 1
Mid morning	Spinach soup - 1 cup or Butter milk - 1 glass
Lunch	Rice - 2 cups / Chappathi - 4, Fish curry or cauliflower peas curry - 1 cup, Dhal and greens sambar - 1 cup Vegetable salad 1 cup, Fruit - 1
Mid afternoon	Lime juice - 1 glass
Evening	Egg sandwich 2 / biscuits - 3, Tea - 1 glass
Dinner	Chappathi - 2, Curd rice - ½ cup, Tomato chutney - ½ cup, Fruit salad - 1 cup
Bed time	Milk - 1 glass

Table 2.9: Suggested Food Preparations for a Lactating Mother

Food preparation	Reasons
Badam kheer, groundnut kheer, carrot halwa, caramel custard	Nuts and milk may increase the milk production. Concentrated foods help in meeting the increased requirement
Garlic and onion chutney	May help in increasing the production of milk
Soups and rasam	Appetisers and help in digestion
Fried snacks like vada, bajji, etc. parathas, paneer parathas	Help in meeting increased calorie and protein requirements

Lactating Mother

Balanced Diet

2.3. Infancy - Growth and development, nutrient requirements, significance of breast feeding, bottle feeding problems, weaning and supplementary foods, need and types

Human growth and development are highly individual processes. Growth may be defined as an increase in size but it encompasses far more than that. Development is the associated process in which growing tissues and organs take an increased complexity of function. The term growth and development is an unified concept and it indicates the magnitude and quality of nutritional changes that transform a small dependent new born into a fully functioning independent adult. Physiologic growth depends on variety of nutrients in the food a child eats. It also depends on the vast number of biochemical processes of metabolism that supply the right materials in a right place at the right time for forming and maintaining unique body tissues.

Human growth and development involves far more than the physical process alone. It takes in social and psychological influences and relationship - indeed the entire environment and culture that promotes individual growth potential. The whole processes produce the whole person. Food and feeding act as a vital part in the wholesome development of the child.

Infancy : During the first year, the infant grows rapidly with the rate tapering off somewhat in the second half. At the age of 6 months an infant will probably have doubled the birth weight and at one year may have trippled it. The head is relatively larger and the face is rounder. The chest tends to be rounded rather than flattened, the abdomen is more prominent and the extremities are proportionately shorter. The human brain is at its peak growth phase at birth and during infancy. By the end of the first year the brain has reached two thirds of adult size. During infancy the first deciduous tooth erupts between 5 and 9 months of age. By one year of age most infants have 4 to 8 teeth.

Physical growth : There is a wide variation in the physical growth of children. Anthropometry is used to monitor a child’s growth. Height and weight are general measurements of physical growth. The head circumference is a valuable measurement for infants. The measurements of abdomen, chest, leg and hands are usually included at periodic intervals.

Clinical examination : Various clinical signs of optimal growth may be observed as measures of a child’s nutritional status as well as growth. These include such factors as general vitality, a sense of well being, posture, the condition of gums and teeth, skin, hair and eyes, development of muscles and nervous control.

Food and feeding practices : Good nutrition is crucial for optimal growth and development. Special feeding method is needed for these tiniest babies to survive. Special consideration has to be given to the type of milk used and methods of feeding. Breast milk is the ideal milk for an infant and has several advantages than tinned milk. It has specific characteristics that match the infants nutritional requirements during the first year of life.

Nutritional requirements : As growth during infancy is rapid, meeting the nutritional requirement is very important. Nutritional requirement for an infant is based on the composition and intake of breast milk of well nourished population combined with the contribution from supplementary foods introduced around 4-5 months of age as mother's milk alone is inadequate after that. The ICMR RDA (2010) for an infant is given in Table 2.10.

Table 2.10 : ICMR Recommended Dietary Allowances for Infants

Nutrients	0 - 6 months	6 - 12 months
Energy (kcal)	92/kg	80/kg
Protein (g)	1.16/kg	1.69/kg
Fat (g)	–	19
Calcium (mg)	500	500
Vitamin A		
Retinol (mcg)	350	350
Beta carotene (mcg)	–	2800
Thiamine (mg)	0.2	0.3
Riboflavin (mg)	0.3	0.4
Niacin (mcg)	710/kg	650/kg
Pyridoxine (mg)	0.1	0.4
Ascorbic acid (mg)	25	25
Folic acid (mcg)	25	25
Vitamin B_{12} (mcg)	0.2	0.2
Vitamin D (IU)	–	200 - 400

Source: Nutrient Requirements and Recommended Dietary Allowances for Indians, ICMR, 2010

1. Energy : The energy recommendations are based on the average secretion of 850ml of milk per day by a well nourished mother. The infants require 108 kcal/kg and 98 kcal/kg during 0-6 and 6-12 months of age respectively. Of the energy supplied 50 percent is used for basal energy, 25 percent for activity and 25 percent for growth. Children may utilize more energy and hence there will not be weight gain unless additional calories are given. After six months, 70 percent of energy requirement is met by breast milk and for the rest supplementary foods have to be given.

2. Protein : Protein requirements should not only meet the need for maintenance but also and for the rapid skeletal muscular growth. Human milk provides all the essential amino acids for proper growth. Protein intake of healthy infants during first 6 months of age is 2g/kg of body weight and after 6 months the protein requirement is 0.65g/kg of body weight. Mother's milk and vegetable protein supplements will provide this requirement.

3. Fat : Adequately breast fed infants receive 30g of fat/day of which 10 percent is linoleic acid and one percent linolenic acid. Breast milk also meets the essential fatty acid requirements. During weaning, the diet should provide 25 percent of energy from fat which should be a blend of visible and invisible fat to reduce bulk.

4. Calcium : Upto 6 months when the infant is solely breast fed 300mg of calcium is adequate. Larger percent of calcium in breast milk is retained by infant. As the baby grows rapid calcification of bones take place which is essential to support the weight of body by the time the baby walks. To meet the requirements ICMR has recommended 500mg of calcium/day throughout infancy.

5. Iron : Infants require iron for growth, expansion of blood volume and for improving iron stores in the body. Considering the availability and absorption of iron an allowance of one mg/kg body weight/day for an infant has been recommended.

6. Vitamins - Vitamin A : On the basis of vitamin A ingested by breast fed infants in well nourished communities the ICMR has suggested 350µg/day of vitamin A throughout infancy.

Vitamin D: Vitamin D requirement is placed between 200-400 IU which can be obtained by adequate exposure to sunlight.

B-Complex vitamins: RDA for B complex vitamins is expressed in terms of weight of an infant which in reality is based on caloric consumption. Completely breast fed infants derive the required thiamine, riboflavin and niacin requirements from breast milk. Breast fed babies receive about 25 to 30 µg/kcal of folic acid/day and most of which is absorbed.

Vitamin C: ICMR has recommended an intake of 25mg of vitamin C/day. This allowance is arrived after considering the beneficial effect of vitamin C on non haem iron absorption.

Importance of breast feeding : Breast milk is ideally suited for the physiological, nutritional and psychological needs of all infants. The newborn baby is usually fed for the first time within twelve hours after being born. Most new borns are able to suck right away, but only for a short time - five or ten minutes at the most.

Importance of Colostrum

1. Colostrum is the milk secreted during the first three days after child birth. This contains less fat and lactose, more sodium, chlorine and zinc.
2. It is high in antibodies protein especially immunoglobulin A and lactoferrin.
3. It guards the infants against infection and also helps to clear out the meconium.
4. The proportion of Poly unsaturated fatty acid (PUFA) is much higher in colostrum than in mature milk.

The composition of colostrum is shown in Table 2.11.

Table 2.11: The composition of colostrum

Nutrient	Quantity / 100 ml
Energy	58 kcal
Protein	2.7 g
Fat	2.9 g
Calcium	3.1 g
Phosphorus	14 mg
Iron	0.09 mg
Lactose	5.3 g
Carotene	186 IU
Vitamin A (Retinol)	296 IU

Source: Guthrie, A.H. Introductory Nutrition. Times Mirror / Mosby College Publishing

Advantages of breast feeding : Human milk is the nature's gift for infants. Breast feeding is the best way of providing ideal food for the healthy growth and development of infants and has a unique biological and emotional influence on the health of both mothers and child and hence may be highlighted as "Breast is Best". The advantage of breast feeding can be considered under nutritional, immunological, psychological, economical and other factors.

i. Nutritional: Caloric value of human milk and cow's milk are similar as is the total fat content. Lower protein content of human milk is compensated by higher amount of lactose. Lactose which is present in higher levels in human milk facilitates the absorption of magnesium and calcium and favours amino acid absorption and nitrogen retention. Human milk contains 1.1 percent protein, 20 percent casein and 80 percent whey protein which contributes lactoglobulin. Lipids present in human milk are unsaturated fat, essential fatty acids, fat soluble vitamins, phospholipids and cholesterol. Calcium content in human milk is 28mg. Infantile tetany rarely occurs in breast fed infants. Low sodium content of human milk is advantageous to the infant kidneys otherwise it will have difficulty in handling excess sodium. Infants need 0.3mg/day iron and human milk meets this requirement. It enhances zinc absorption and copper content in breast milk. It contains more vitamin A, C and E than cow's milk.

ii. Immunological factors : The following factors in breast milk provides passive immunity, which does not require the activation of the infants own immune defences.

a) Macrophages: They can digest bacteria and also develop immunity against infectious diseases.

b) Lymphocytes: Lymphocytes produce antiviral substances like interferon. Lymphocytes also produce lymphokynes and other growth factors which stimulate proliferation and differentiation in the lymphoid tissue and its capacity to react with antigens.

c) Lactoferrin: It is an iron binding protein that inhibits the growth of E.coli and other bacteria by binding the iron needed for their growth.

d) Lactobacillus bifidus factor: It is an amino sugar and contains N-acetyl neuraminic acid. It discourages the growth of pathogenic organisms.

e) Enzymes: Breast milk also supplies enzymes like lipase, amylase and lactoperoxidase which increase digestibility and also destroy the harmful micro organisms.

f) Immunoglobulin: They are defensive proteins which include all types of antibodies. Immunoglobulin A is found in relatively high levels which offers protection against polio viruses, streptococcus and pneumococcus.

iii. Economic factors: Breast milk is the most economic food for the baby. In other words, breast milk is cheaper than any other type of artificial foods.

iv. Psychological factor: An infant derives a sense of security and belonging in the mother child's relationship. Mother also feels that she is involved in a unique process for which there is no substitute. It provides the mother a sense of calm and satisfaction which favours the production of required hormones.

v. Physiological control:

Breast feeding is an important birth control method. Prolactin which stimulates milk production decreases the synthesis of ovarian hormones. The uterus of mother comes back to normal size and arrests bleeding due to the secretion of oxytocin. It enables the mother to shed extra weight accumulated during pregnancy.

In order to promote breast feeding and provide safe and adequate nutrition for the infant the Government of India has formulated the Indian National Code for Protection and promotion of breast feeding. Subsequently the Infant Milk Substitute Act (IMS, 1992) was passed to protect, promote and support breast feeding. According to this Act there should be

- No promotion of infant feeding products
- No display of artificial feeding products in health care facilities
- No company personnel should contact mothers for marketing
- Any brouchures, booklets, which advertise infant feeding products should not be permitted.

Breast feeding significance

To the mother

1. The baby's sucking stimulates her breast and helps in secretion and speedy return of her uterus to its former size and condition
2. Breast feeding saves time, energy and cost of making a formula
3. Breast feeding is psychologically valuable. The mother feels that she is giving something that no one else can
4. Breast feeding prevents the mother from getting breast cancer.

To the baby:

1. Breast feeding takes away the possibility of getting contaminated milk
2. Breast milk has the necessary nutrients in the right proportions
3. Breast feeding offers warmth and security to babies
4. Digestive upsets and constipation are rare among breast fed babies
5. The active sucking needed to draw milk from the breast stimulates the development of the lower parts of the baby's face.

WABA:

The World Alliance for Breast Feeding in Action in Collaboration with WHO and UNICEF promote breast feeding and has declared August 1-7 every year as the world breast feeding week.

Celebrating Breast Feeding Week

- Disseminate simple information on provisions of IMS Act information on unethical practices by companies
- Organise Mahila Mandals and make them aware on exclusive breast feeding and optimal feeding practices
- Organise seminars on best practices of breast feeding and complementary feeding for families and health care providers
- Link with Child Rights Movements in your State/District
- Link with Rotary / Inner Wheel Club / Lions Club in your District / State
- Collect information at the local level on infant feeing practices (Information on culture belief and myths related to breast feeding).

Artificial feeding: Though breast milk is the best milk there can be no substitute for it, there are certain circumstances during which the infants need to be given artificial feeds.

Reasons related to mother

1. Illness of short duration like fever, cracked nipples or severe illness like tuberculosis and heart disease.
2. The mother is on steroids, anticoagulants or radioactive drugs.
3. Insufficient milk secretion
4. Death of mother.

Reasons related to infant:

1. Extreme prematurity
2. Acute infections
3. Congenital deformities like cleft palate and gastrointestinal tract obstructions.

In the absence of breast milk, animal milk or toned milk is given as a substitute which need not be diluted. In cases when the infant is not able to digest, milk can be diluted using boiled water in the ratio of 3:1. When the baby is fed artificially supplements of iron and vitamin C are essential.

Artificial milk formulae in dry form prepared from animal milk are available in the market which have been modified in nutrient content so as to resemble breast milk. These formulas are fortified with iron. Whenever the infant is fed with an artificial food utmost care in handling and preparing the feed is essential. This includes cleanliness of utensils, bottles and rubber nipples.

Advantages of bottle feeding

- Creates no additional requirements in the mother
- No problems in establishing milk supply
- Creates no problem for working mother

- The volume of milk given is visible
- Less jealousy may be incurred because other members of the family can feed the baby.

Problems in bottle feeding:

A baby may be crying for a feed and yet when he is offered a bottle he may push it away. This may be due to blocked hole in the teat or the milk may be too hot or too cold, or too sweet or not at all sweet. All this should be looked into. Another problem is that sometimes a vacuum is created in the bottle especially with a very soft, worn-out teat and so the baby cannot suck. Simply by lifting the edge of the teat and allowing them to enter the bottle, the problem can be dealt with. The hole in the teat should be such that if we press it as a baby would while sucking, thin stream of milk pours out.

The bottle should be held obliquely so that its mouth remains full of milk. This prevents execessive swallowing of air, other than this, when the bottle is not sterilised properly, bottle tooth decay occurs. Constipation, failure to sleep, irritability and excess crying can result due to underfeeding. Mild diarrhoeal disturbances can also occur due to over feeding.

Key points in artificial feeding

- Good knowledge
- Facility for boiling and sterilizing bottles
- Clean source of water
- Reliable milk supply
- Adequate washing facilities
- Sufficient money
- Time to prepare feeds

Types of milk and how much milk to be given

Animal milk commonly used in India are cow and buffallo. The nutritive value of various types of milk and human milk is given in the Table 2.12.

Table 2.12: Nutritive Value of Various Milks (in 100g)

Type of milk	Carbohydrate (g)	Protein (g)	Fat (g)	Energy (kcal)
Human	6.8	1.5	4.5	68
Cow	5.5	3.5	3.5	66
Buffallo	4.5	4.3	7.5	103
Goat	4.5	3.7	4.8	76

Ordinary undiluted boiled milk with added sugar can be given to the baby 5 to 6 times during the day. The quantity will vary to a certain extent with each baby. The following is an approximate guide.

Quantity of Milk Needed for Infants

Age of infant	Approximate Feed of milk
Birth to 1 month	50-75 ml 6-7 times a day
1 month to 2 months	75-100 ml 6-7 times a day
2 months to 4 months	100-125 ml 5-6 times a day
4 months to 6 months	150-175 ml 5 times a day
Beyond 6 months	175-200 ml 4-5 times a day

If the baby is happy and gaining weight, then it means that the child is being adequately fed.

Modification of animal milk formula for infant feeding is done in the following ways:

1. Adjustment of fat content to that of human milk
2. Boiling
3. Dilution and addition of sugar

1. Adjustment of fat: Buffalo's milk contains more fat. Infants can be fed with skimmed milk.

2. Boiling: Boiling brings about physio-chemical changes in the milk and helps to reduce markedly curd tension of the milk.

3. Dilution of water and addition of sugar: Dilution with water is essential to reduce the contents of proteins and various minerals. Animal milk is generally diluted with equal amounts of water for feeding infants of 1-2 months of age.

The portion of water is reduced gradually as the infant grows. Sugar is added at five per cent level in the diluted milk. While using powdered milk it is important to remember that the scoop should be filled and heaped. Usually 30ml of water is needed for one scoop of milk powder. It is important that the water for making up milk should be boiled.

Breast feeding is always safer than bottle feeding and Table 2.13 shows the differences between breast milk and bottle milk.

Table 2.13: Differences between Breast Milk and Bottle Milk

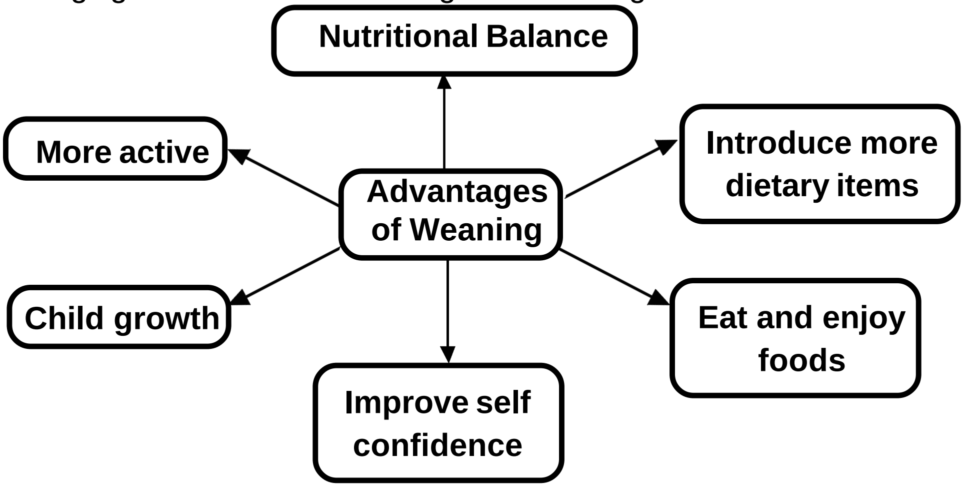
S.No.	Breast milk	Bottle milk
1.	It enhances the resistance power and immunity of the baby	There is a problem of cleaning and sterilizing bottles and teats
2.	Breast feeding is simple, readily available and clean	The resistance power is comparitively low in bottle fed babies
3.	The infection rate is low	The infection rate in bottle fed babies is high
4.	Child feels secure and enjoys the warmth of mother	The child feels insecure if not handled with care
5.	Human milk has anti allergic properties	Bottle fed babies have more risky allergies
6.	All nutrients are available in the right proportion and amount	Indigestion or diarrhoea may occur due to proportionate changes of milk

Weaning: The term "Weaning" comes from the word "Wemain" which is to accustom. Weaning begins from the moments supplementary food is started and continues till the child is taken off the breast completely. Solid food is added to infant's diet. Weaning is the process of transition from a pure milk based intake by a child to a semisolid diet.

Need for weaning: Infants in our country thrive on breast milk upto six months of life and their growth rate during this period is satisfactory. But after six months, breast milk alone is not sufficient to provide all the nutrients needed to maintain growth. Increasing needs of calories and protein of growing children cannot be met by the diminishing output of mother's milk. National Institute of Nutrition, Hyderabad recommends the introduction of supplementary foods to cater to the increasing need of calorie, protein, vitamin C and D. Introduction of weaning foods too late can lead to undernutrition and increased diarrhoeal morbidity. The age of introduction of supplementation is 3-5 months in urban area and 7-9 months in rural poor area. Weaning food should provide atleast 10 per cent of energy as protein.

Advantages of Weaning

Following figure shows the advantages of weaning



Types of supplementary foods: I. Liquid supplements

1. Milk 2. Fruit juices 3. Soup

1. Milk: Initially milk can be given diluted with water in the ratio of 3:1. The amount of water can be reduced so that the infant consumes undiluted milk within a week.

2. Fruit juices: Fruit juices of tomato, grapes, oranges and sweet lime can be given, when this is introduced between 4-6 months, a teaspoon of it can be diluted with little water and given. Gradually the quantity can be increased and undiluted juices can be given.

3. Soups: Soups of green leafy vegetables can be given. The leafy vegetables are washed well with and prepared in the form of soup by boiling with a minimal amount of water and a little salt and onion. In the beginning, the soup is strained, later on unstrained soups can be given.

II. Semi solid supplements: Semi solid supplements of cereals and vegetables may be given at 5-6 months. The first solid food commonly offered is cereal and starch gruels or starchy vegetables like potato, well cooked and mashed. In case of cereals small quantities of milk and sugar are added. Calorie dense foods can be prepared by using malted wheat or ragi.

1. Vegetables: Vegetables like, potato, carrot, green leafy vegetables can be cooked, mashed and introduced starting with small quantities, which supply vitamins and colour to the diet.

2. Fruits: All fruits except banana must be stewed and sieved for one year old babies.

3. Non-vegetarian foods: Yolk of egg can be introduced at 6-7 months. Half a teaspoon of yolk can be started with and if tolerated gradually increased to one yolk and it can be introduced as soft custard. Egg white because of its allergic manifestation is given only after 10 months. Ground and cooked meat and boiled fish can be given with little flavouring and salt.

4. Pulses: Well cooked pulse along with cereal in the form of kichadi or pongal can be given or can be made into porridge. Pulse and meat preparations can be given on alternate days, so that the baby receives each of these 3 or 4 times a week.

III. Solid supplements: When the baby starts cutting teeth, solid supplements are given. Solids like idli, chappathi, dosai, rice and dhal can be given after the child gets used to semisolids. Meat may be minced fine instead of ground.

Vegetables chopped and boiled, leafy vegetables soft and boiled, raw carrots and fruit segments without skin and seed can be given. When fed with solid supplements plenty of water should be given to the child. Small amounts of boiled, cooked water has to be given 2 to 3 times a day and more often during hot weather.

Table 2.14 indicates the quantity of different foods to be included in the diet of 6-12 months old infant.

Table 2.14: Food Requirements for Infants (6-12 months)

Food groups	Quantity (g)
Cereals and millets	45
Pulses	15
Milk (ml)	500*
Roots and tubers	50
Green leafy vegetables	25
Other vegetables	25
Fruits	100
Sugar	25
Fats / oils (visible)	10

Source: Dietary Guidelines for Indians - A Manual, National Institute of Nutrition, ICMR, Hyderabad, India, 2005.

*Quantity indicates milk apart from breast milk

For breast fed infants 200ml is required. Care should be taken during preparation of diets.

Points to be considered in weaning

- Weaning is the process of withdrawal from dependence on breast milk to prepared semisolid and then solid food. The age of weaning varies with culture, country and economic status.

- Cereals are the most common weaning food and the weaning food should be adequate in energy, protein, essential dietary constituents and water.
- The mode of preparation will vary with the major risk being bacterial contamination of the feed.
- Introduce only one food at a time
- Small amounts of solid food should be given at the beginning and the amount gradually increased.
- The child should never be fed by force. If the child shows dislike for a particular food, it should be removed from the diet. If the dislike persists the food can be replaced by a substitute.
- Food given should not be spicy. Fried foods should also be avoided.
- Variety in child's diet is important to make it more appealing. As soon as the baby accepts a particular food well, the next one may be started.
- To inculcate good eating habits encourage the child to eat all types of food, the parents should never show any personal dislike towards any food
- Freshy prepared food should be given
- Fruit juice should be fed only by cup and not by bottle.

Healthy Infant

Low cost supplementary foods developed in India

The following Table 2.15 gives a list of some of the low cost nutritious supplementary foods recommended by different institutions which can be given by the mothers and Table 2.16 shows same suggested foods for intants.

Table 2.15: Low Cost Weaning Foods

Name	Composition
Indian Multi Purpose Food (CFTRI, Mysore)	Low fat ground nut flour and bengal gram flour (75:25) fortified with vitamin A, D, B_1, B_2 and calcium carbonate, cotnains 42% proteins
Malt Food (CFTRI, Mysore)	Cereal, malt, low fat ground nut flour, roasted bengal gram flour (40:40:20) fortified with vitamins and calcium balls, cotnains 28% protein
Balahar (CFTR, Mysore)	Whole wheat flour, ground nut flour and roasted bengal gram flour (70:20:10) fortified with calcium salts and vitamins, contains 20% protein
Kuzhandai Amudhu (Avinashilingam Deemed University, Coimbatore)	Roasted maize / ragi flour, green gram flour, roasted ground nut and jaggery (3:2:1:2) contains 14.4% protein.
Win Food (Gandhigram Rural Institute, Gandhigram)	Pearl millet, green gram dhal, ground nut flour and jaggery (50:15:25:25). Contains 20% protein
Amirtham (Avinashilingam Deemed University, Coimbatore)	Wheat (roasted) - 31.5g roasted bengal gram - 18.8g, soya flour-6.2g, roasted ground nut, sugar - 25g contains 20% protein
Poshak	Cereal (wheat, maize, rice or jowar) Pulse (Channa dhal or greengram dhal) Oil seed (ground nut) and jaggery (4:2:1:2)

Table 2.16: Some Suggested Foods for Infants

Food	Reasons
Fruit juice (6 months)	Provides vitamin C which is lacking in milk. Tomato and orange juice also supply some amount of beta carotene
Greens soup (6 months)	Child gets used to new taste. Provides iron, calcium, beta carotene, riboflavin, vitamin C
Stewed apple (8 months)	Gives calories and should not be given in raw pieces since it may choke the child
Soft custard with egg yolk (8 months)	Provides vitamin A, iron, protein and B vitamin. Egg white should be introduced later as it may cause allergy
Kichadi (Pongal), idli, chappathi and milk (10-12 months)	Easily digestible and gives calories and good quality protein
Malted cereals and gruels made out of rice/rice flour, corn flakes, milk	Meets increased demands of calories and protein

Preterm Babies: The preterm babies are those who are born before 37 weeks of gestation. Low birth weight babies are born with a birth weight of less than 2500g. The incidence of low birth weight babies in India is 30 per cent.

Reasons for low birth weight babies

1. Low maternal Body Mass Index
2. Low age at marriage
3. High parity
4. Small stature
5. Low gain in weight during pregnancy
6. Low maternal nutritional status with respect to iron and folic acid
7. Shorter duration of full term gestation

Feeding of preterm babies: The feeding is one of the major challenges in the case of low birth weight babies. Goal of feeding preterm baby is to achieve a growth rate that approaches the normal growth rate of foetus in uterus.

Problems of preterm babies are

1. Poor sucking and swallowing reflexes
2. Relatively high caloric requirement with small stomach capacity
3. Incompetent cardio oesophageal sphincter leading to aspiration
4. Decreased absorption of essential nutrients

Nutritional requirements: The caloric need of non-growing preterm babies during the first week of life is 60 kcal/kg/day. After one or two weeks of life they require 120-150 kcal/kg/day to maintain satisfactory growth. The milk of mothers delivered premature babies has higher calories, fat, protein and sodium content which is suitable for the nutritional needs of low birth weight babies. If the baby does not gain weight satisfactorily with breast milk alone, dietary supplements like vegetable oils may be used which increase the caloric value without increasing its volume.

Weaning Food

2.4. Immunization - Communicable Diseases, Control Measures, Immunization Schedule, Management of Children at Risk

Health is a common theme in most culture. An understanding of health is the basis of health care.

Webstar defines "health as the condition of being sound in body, mind and spirit especially freedom from physical disease or pain". According to Oxford English Dictionary "health means soundness of body or mind or the condition in which its functions are duly and efficiently discharged".

WHO defines "health as a state of complete physical, mental and social well being and not merely an absence of disease or infirmity". Health for all, a new philosophy is the growing concern about the unacceptably low levels of health status of the majority of world population especially the rural poor. Health for the people by the people is the common goal of primary health. A good many common ailments can often be avoided if public are conscious about the communicable diseases transmitted from man to man or animal to man directly.

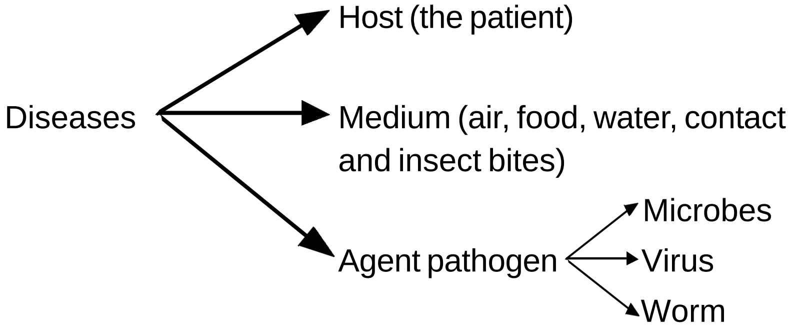
How Diseases Spread : The term disease literally means without ease (uneasiness), the opposite of ease when something is wrong with bodily functions. Illness refers not only to the presence of specific disease but also the individuals perception and behaviour in response to the disease as well as the impact of that disease on the psychosocial environment. Sickness refers to a state of social dysinfection.

Diseases are of three types as follows:

1. Infectious Disease : A clinically manifested disease of man or animals resulting from an infection.

2. Contagious Disease : A disease that is transmitted through contact (eg) scabies, leprosy.

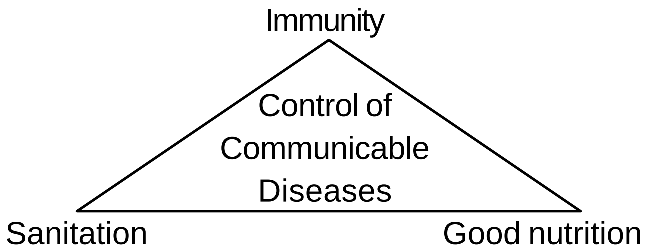
3. Communicable Disease : An illness due to specific infectious agent or its toxic products capable of being directly or indirectly transmitted from man to man, animal to animal or from the environment through, air, dust, soil, water, food etc. to man or animal.



Communicable diseases are caused by agents / pathogens. These include micro organisms like bacteria virus and worms. The child or the individual who gets disease is commonly called a host. The time of pathogen entry to the appearance of the disease symptom is called incubation period of the disease.

Control of Communicable Diseases

Communicable diseases can be prevented and controlled by the following three methods as shown below.



Mode of Transmission : Communicable diseases may be transmitted from the reservoir or source of infection to a susceptible individual in many ways depending upon the infectious agent. The mode of transmission of infectious diseases may be identified as follows:

A) Direct Transmission

1. Direct contact
2. Droplet infection
3. Contact with soil
4. Inoculation into skin or mucosa
5. Transplacental (Vertical)

B) Indirect Transmission

1. Vehicle borne
2. Vector borne
   - Mechanical
   - Biological
3. Air borne
   - Droplet nuclei
   - Dust
4. Fomite-borne
5. Unclean hand and fingers

A) Direct Transmission

i. Direct contact : Infection may be transmitted by direct contact from skin to skin, mucosa to mucosa. This implies direct and essentially immediate transfer of infectious agents from the reservoir or source to a susceptible inidividual without intermediate agency (eg) skin to skin contact by touching. Diseases transmitted by direct contact include AIDS, leprosy, skin and eye infections.

ii. Droplet infection : This is direct projection of a spray of droplets of saliva and naso pharyngeal secretions during coughing and sneezing as spitting or talking into the surrounding atmosphere. The droplets which contain millions of bacteria and virus can be a souce of infection to others. When a healthy susceptible person comes within the range of these infected droplets he is likely to inhale some of them and acquire infection. For

example, respiratory infections, infection of nervous system, common cold, diphtheria, whooping cough, TB etc. The potential for droplet spread is increased in conditions of close proximity, overcrowding and lack of ventilation.

iii. Contact with soil : The disease agent may be acquired by direct exposure of susceptible tissues to the disease agent in soil, compost or decaying vegetable matter in which it normally leads a saprophytic existence (e.g. tetanus, hookworm larvae etc.)

iv. Inoculation into skin or mucosa : The disease agent may be inoculated directly into the skin or mucosa. (eg) rabies viruses by dog bite, hepatitis B virus through contaminated needle or syringes etc.

v. Transplacental (or vertical) transmission : Disease agents can be transmitted transplacentally. This is another form of direct transmission. For example rubella virus, syphillis hepatitis.

B) Indirect Transmission : This embraces a variety of mechanisms including the traditional 5Fs - Flies, fingers, fomites, food and fluid. An essential requirement is that the infectious agent must be capable of surviving outside the human host in the external environment and retain its basic properties of pathogenesis and virulence till it finds a new host. If these disease agents aquire drug resistance, it will further facilitate its spread. It may occur in a variety of settings.

i. Vehicle borne : Vehicle borne transmission implies transmission of the infectious agents through the agency of water, food (including raw vegetables, fruits, milk and milk products) ice, blood, serum, plasma and other biological products such as tissues and organs. Of this water and food are the most frequent vehicles of transmission. Examples of this type of disease include acute diarrhoea, typhoid fever, cholera, polio, hepatitis A, food poisoning and intestinal parasites. Those transmitted by blood include hepatitis B, malaria, syphillis, brucellosis.

ii. Vector borne : In infectious disease epidemiology vector is defined as an arthropoid or any living carrier (e.g. Mosquitoes). Transmission by a vector may be mechanical or biological. Invertibrates like flies, mosquitoes, cockroaches and vertibrates like rodents, bats, man, bird etc. cause vector borne diseases.

Transmission and propagation of parasites

a) Mechanical transmission : The infectious agent is transported mechanically by flying, crawling, excretion.

b) Biological transmission : The infectious agent undergoes replication or development and requires an incubation period before vector can transmit. This is of three types namely

i. Propagative : The agents multiply in vector but does not change in form (eg) plague bacilli in rat

ii. Cyclo propagative : The agent changes in form and number (eg) Malaria parasites in mosquitoes.

iii. Cyclo developmental : The disease agent undergoes only development but not multiplication (eg) nymph to adult is known as trans-stadial transmission.

3. Air borne

i. Droplet nuclei : Droplet nuclei are a type of particles implicated in the spread of air borne infection. They are tiny particles (1-10 microns range) that represent the dried residue of droplets. This may be formed by evaporation of droplets coughed or sneezed into the air or generated purposefully by a variety of atomising devices. The droplet nuclei may remain airborne for long periods of time, some retaining virulence. They not only keep floating in air but may be disseminated by air currents from the point of their origin. Diseases spread by droplet nuclei include tuberculosis, influenza, chickenpox, measles, fever and many respiratory infections.

ii. Dust : Some of the larger droplets which are expelled during talking, laughing or sneezing, settle down by their sheer weight on the floor, carpets, furniture, clothes, bedding and other objects of immediate environment. During the act of sweeping, dusting and bed making dust particles are blown from soil to the wind and they may settle in uncovered food and milk.. Diseases spread by dust include streptococcal and staphylococcal infection, pneumonia, fever, tuberculosis.

4. Fomite borne : Substances other than water or food contaminated by infectious discharge from a patient and capable of harbouring and transferring the infectious agent to a healthy person. Fomites include soiled clothes, towels, linen, handkerchiefs, cups, spoons, pencils, books, toys, drinking glasses, taps, syringes, instruments and surgical dressings. Diseases transmitted by fomites include diphtheria, typhoid fever, bacillary dysentry, hepatitis A, eye and skin infections.

5. Unclean hands and fingers : Hands are the most common means by which pathogenic agents are transferred to food from the skin, nose, bowel etc as well as from other foods. Transmission takes place both directly (hand to mouth) and indirectly. Examples include staphylococcal and streptococcal infections, typhoid fever, dysentry, hepatitis A and intestinal parasites etc.

Child with Fever

The common ailments and preventive measures to be followed are indicated in Table 2.17.

Table 2.17: Diseases and Preventive Measures

Diseases / Symptoms	Preventive measures
1. Diarrhoea, vomitting, jaundice, worms excretion	1. Hands should be washed before and after handling food 2. People should boil water and milk before drinking 3. Chlorinate all drinking water sources 4. All foods should be covered to protect from flies 5. Stool and vomit of the patients should be buried so that flies do not settle on them 6. All eating utensils especially those used by the patients should be properly washed 7. ORS solution should be given to patients to avoid dehydration 8. The environment should be kept neat and tidy
2. Rashes with fever	1. Isolate the patient 2. Keep the patient in bed in clean and ventilated room 3. Dressings and other things which have been in contact with the patient are burnt or burried 4. Soiled clothing or linen of the patient is washed, boiled and dried in the sun
3. Cough and cold	1. Isolate the patient especially from young children 2. Teach people not to spit or clear the nose indiscriminately 3. Teach people to cover the nose when sneezing or coughing 4. Give vitamin C rich foods 5. Patients should drink hot water
4. Eye discharge	1. Ensure that no one else uses the patient's towel or handkerchief 2. Teach people not to allow flies to settle on their eyes 3. Use sponge or clean clothes to clean the eyes and face
5. Constipation	1. Give water to drink between meals 2. Suitable exercises and massages are compulsory 3. Correct the diet adding fruits and fresh vegetables rich in fibre content
6. Red and sore buttocks	1. Avoid washing them with soap and water but clean them with a piece of cotton wool soaked in warm olive oil 2. Put some lanoline on a piece of lint and cover the sore part

Immunization :

Prevention is better than cure. Several of the very serious diseases of childhood such as poliomyelitis - which used to kill or cripple many people, could be made to disappear because of immunization.

Immunity :

It is the resistance of the body against germs or their poisons (toxins). When a germ enters the body, special substances called antibodies are produced against toxins. At birth, babies derive a lot of immunity from their mothers, but they gradually wear off during the first few months. It is because of the congenital immunity. Measles is very rare in the first six months of life.

Vaccination :

The word comes from vaccine or cow pox which was used by Edward Jenner more than 150 years ago to protect a body against small pox. For many vaccination it is common to use a live germ (a bacterium or virus) which is very much like the germ that causes the disease but is much weaker. Examples of this are small pox, vaccine, poliomyelitis vaccine, rubella vaccine and BCG for tuberculosis. Vaccination induces protection (immunity) against infection or disease caused by microbes.

Immunization :

The word immunization is used when chemical substances are injected to counter act the effect of toxins. Examples of illness produced by toxins are diphtheria and tetanus.

S.No.	Active immunity	Passive immunity
1.	Immunity that depends upon stimulation of the body's own defences via vaccination is active immunity	The chemical defender or antibodies are directly injected into the body
2.	Substances used to provide lasting immunization that do not cause disease	It provides immediate temporary immunization against specific disease causing bacteria, viruses or toxins

Immunization Schedule

The immunization schedule approved by the Indian Academy of Paediatrics (IAP) is given in Table 2.18.

Table 2.18: Immunisation Schedule

Age	Vaccine
Soon after birth	Hepatitis B 1st dose, OPV 1st dose BCG
6 weeks	Hepatitis B 2nd dose, OPV 2nd dose DPT 1st Dose
10 weeks	DPT 2nd dose OPV 3rd dose
14 weeks	DPT 3rd dose OPV 4th dose
6 months	OPV 5th dose Hepatitis B 3rd dose
9 months	Measles
15 to 18 months	MMR
18 months	DPT, OPV, 1st Booster dose
2 years	Typhoid vaccine
5 years	DPT, OPV 2nd Booster Dose, Typhoid
8 years	Typhoid
10 years	Tetanus toxoid

Source : IAP (2009)

Abbreviations: BCG - Bacillus Calmittee Guerin; MMR - Mumps, Measles, Rubella
DPT - Diphtheria, Pertussis and Tetanus; OPV - Oral Polio Vaccine
DT - Diphtheria and Tetanus Vaccine

Communicable and Infectious Diseases : Infectious disease will last as long as humanity itself. Commonly occurring diseases can be classified under three heads and is given in Table 2.19.

A) Respiratory Infection

i. Diphtheria

ii. Whooping cough

iii. Measles, mumps, rubella

iv. Acute respiratory infections

v. Tuberculosis

B) Intestinal Infections

i. Cholera

ii. Typhoid fever

iii. Hepatitis B

C) Arthropod borne infections

i. Malaria

ii. Dengue fever

D) Zoonoses

i. Rabies

ii. Plague

iii. Chickungunya fever

Table 2.19: Communicable Diseases and Preventive Measures

A) Respiratory Infections

Name of the disease	Causes	Symptoms	Control and prevention
a) Chicken pox i. Varicella	Varicella - Zoster (V-Z) virus	Fever with rashes, vesicles filled with clear fluid and looks like dew drops' on the skin	Vaccination, varicella virus vaccine for children at the age of 12-18 months
ii. Measles a) Rubeola	Virus from a group of myxo viruses	Fever, followed by cough and typical rashes	MMR vaccine
b) Mumps	Caused by an RNA virus classified as Rubeola virus	Enlargement and tenderness of one or both parotid glands	MMR vaccine
c) Rubella (German Measles)	RNA virus togavirus family	Mild fever, maculo papular rash. Infection in early pregnancy results in death of foetus	Rubella vaccine or MMR vaccine
iii. Diphtheria	Corynebacterium diphtheriae	Formation of greyish or yellowish membrane (false membrane) over the tonsils, pharynx, with well defined edges, oedema, enlargement of lymphnodes, toxaemia etc.	DPT vaccine or DT (Diphtheria, tetanus toxoid)
iv. Whooping cough (Pertussis	Pertussis bacteria	Mild fever, irritating cough gradually becoming with the characteristic whoop often with cyanosis and vomiting	DPT vaccine

v. Acute respiratory infections	Measles virus and pertussis bacteria	Causes inflammation of the respiratory tract anywhere from nose to alveoli. This includes common cold, running nose, pharyngitis. Bronchitis may lead to pneumonia.	Measles vaccine HIB vaccine (Haemophilus influenza type B) better nutrition and reduction of smoke pollution
vi. Tuberculosis (TB)	Mycobacterium Tuberculosis	Primarily affects lungs causing pulmonary tuberculosis. Affects intestine, bones and joints, lymph glands, skin and other tissues of the body	BCG vaccine (Bacilli Calmette Guerin)

B) Intestinal Infections

Name of the disease	Causes	Symptoms	Control and prevention
i. Poliomyelitis	Viral infection by polio virus	Primarily an infection of human alimentary tract but the virus may infect central nervous system resulting in varying degrees of paralysis	OPV of 3 doses (Oral polio vaccine) at one month intervals
ii. Cholera	Vibrio cholerae (V.Cholerae)	Sudden onset of profuse, effortless watery diarrhoea followed by vomiting, rapid dehydration muscular cramps and suppression of urine	Two types of oral cholera vaccine. Apart from this sanitary measures and rehydration therapy followed
iii. Viral hepatitis B	Hepatitis B Virus	Acute systemic infection in the liver and may lead to liver cancer	Hepatitis B immunoglobulin vaccination (HBIG)
iv. Typhoid fever	Salmonella typhi	Continuous fever for 3 to 4 weeks with involvement of lymphoid tissues and considerable constitutional symptoms	Anti typhoid vaccines, protected and purified water supply, improvement of basic sanitation, good hygiene

C. Arthropod borne infections

Name of the disease	Causes	Symptoms	Control and prevention
i. Malaria	Female Anopheles mosquito	Headache, nausea, vomiting, fever, body temperature rises rapidly	Chloroquine tablets, malaria vaccine
ii. Dengue fever	1,2,3,4 of sero type dengue virus	High fever, intense headache, muscle and joint pains, which prevent all movement, sore throat with high fever and constipation and general depression	Isolation and bed rest, use of mosquito repellents, proper good storage of water and providing hygienic environment

D. Zoonoses (Diseases and infections which are naturally transmitted between vertebrate animals and man)

Name of the disease	Causes	Symptoms	Control and prevention
i. Rabies	Lyssa virus-I a type of rabies virus transmitted to man usually by bites of dog. It is also called as street virus	Infects the central nervous system, the virus spreads to nerves and many tissues including skeletal and myocardial muscles, adrenal glands and skin	Anti rabies vaccine or Human rabies immunoglobulin vaccination is recommended
ii. Plague (A disease of rodents)	Rattus rattus	Sudden fever, headache, prostration and painful lymphnodes	Treated by Tetra cycline and Streptomycin medicines and antibiotics
iii. Chickungunya fever	The Chickungunya virus and Mansonia mosquitoes	Fever, vomiting pain, swelling and stiffness in wrist, elbow, shoulder, knee, ankle and joints	Paracetamol, chloroquine tablets along with supplementation

E. Surface Infection

Name of the disease	Causes	Symptoms	Control and prevention
i. Tetanus	Caused by clostridium tetani. Infected wound and soil	Muscular rigidity which persists throughout illness, punctuated by painful paroxysmal spasms of the voluntary muscles and lock Jaw	Tetanus toxoid or combined vaccine, DPT prevents tetanus

Management of Sick Children

1. Follow the nurse or doctor's instructions. Failure to carry out even the smallest detail may prove serious
2. Give the child a soft convenient bed
3. See that the room is kept spotlessly clean
4. Do not allow visitors while he has a temperature or if he has an infectious complaint
5. Provide separate towels and equipment for his use see that they are clean
6. Keep him warm, but have the window open
7. See that the child has bowel movements every day
8. Wash hands before and after taking care of the patient
9. Encourage him to eat the food suggested by the doctor by giving small servings and by making the food look attractive
10. If it is essential for him to stay in bed see that he is provided with suitable toys or some other means of occupying the time
11. Do not talk on the seriousness of the disease in front of the sick children.

Questions

PART - A

I.A) Choose the Correct Answer

1. The calcium requirement per day for a pregnant woman is ______
   a) 400 mg b) 1200 mg c) 600 mg
2. An embryo can be identified as human in ______ fertilisation
   a) Just 2 weeks b) 2 to 8 weeks c) 9 to 10 days
3. “Morning sickness” is a symptom during ______
   a) Pregnancy b) Lactation c) Menopause
4. The milk secreted soon after delivery is called ______
   a) Mature milk b) Colostrum c) Immature milk
5. Average daily milk production by a lactating mother is ______
   a) 850 ml b) 550 ml c) 200 ml
6. ______ in breast milk develop immunity against infectious diseases among infants
   a) Enzymes b) Hormones c) Macrophages
7. Breast feeding week is celebrated every year during the first week of ______
   a) August b) September c) June
8. ______ is one of the homemade weaning food
   a) Amirtham b) Horlicks c) Bournvita
9. Communicable diseases are caused by ______
   a) Antibodies b) Pathogens c) Lymphocytes
10. Malaria parasites in mosquitoes spread through ______ method.
    a) Propagative b) Cyclo propagative c) Cyclo-developmental
11. Measles vaccination should be given during ______
    a) Nine months b) 14 weeks c) 6 weeks
12. During 15 to 18 months of a child ______ vaccination should be given
    a) DPT b) MMR c) BCG
13. BCG vaccnination should be given ______
    a) Soon after birth b) At 6 weeks c) At 2 years
14. Tuberculosis is a ______ infection
    a) Respiratory b) Intestinal c) Arthropod borne
15. Rabies virus is transmitted to man by ______
    a) Rat b) Dog c) Mosquito

B) Answer in one or two sentences

1. What is the iron allowance for a pregnant mother?
2. What is pica?
3. PIH - Expand.
4. Write on FAS?
5. What is MMR?
6. Define IMR.
7. How will you calculate MMR?
8. Write the meaning of “dai”.
9. How do you calculate IMR?
10. Give examples for galactogogues.
11. Expand WABA.
12. Write the amount of milk needed for a 4 months old child per day.
13. Describe the types of supplementary foods.
14. Suggest any two recipes as supplementary foods.
15. Who are preterm babies?
16. Give two examples for contagious diseases.
17. Give any two examples for diseases transmitted by direct contact.
18. Write the model of direct transmission of infectious diseases.
19. Define active immunity.
20. Write any two arthropod borne infection.
21. Identify the causative factor for diphtheria.
22. How will you prevent poliomyelitis?
23. Write the casuative factor for typhoid fever.
24. What is DPT?
25. Write the meaning of vector borne.

PART - B

II. Answer in five lines

1. What are the phases of foetal development?
2. Bring out the relationship between maternal and foetal nutrition.
3. List the need for additional requirements for a pregnant woman.
4. List the food requirements for a pregnant woman doing sedentary work.
5. What is pregnancy induced hypertension?
6. List the causes of maternal mortality.
7. Give the composition of mother’s milk.
8. Mention the importance of colostrum.

9. What is immunoglobulin?
10. List the problems in bottle feeding.
11. Write the points to be considered in weaning.
12. Write the composition of Kuzhandai Amudhu.
13. What are the different types of diseases?
14. How do you treat the child affected by rashes with fever?
15. Define vaccination.
16. Define immunization
17. Write the differences between active and passive immunity.
18. Outline the causes and symptoms of rubella.
19. What are the symptoms of cholera and how do you prevent it?
20. What are the causes, symptoms of chickungunya fever and how do you control the disease?

PART - C

III. Answer in one page.

1. Discuss the growth and development of the foetus.
2. Explain the diet during pregnancy and frame a model diet plan.
3. What is maternal mortality? Discuss the causes and prevention of maternal mortality.
4. Enumerate the factors that affect the volume and composition of breast milk.
5. Discuss the diet during lactation. Give a sample menu.
6. Explain the advantages of breast feeding.
7. Tabulate the differences between breast feeding and bottle feeding.
8. Explain the types of supplementary foods for infants.
9. What are the common ailments among children? Explain the preventive measures.
10. Bring out the current immunization schedule.

PART - D

IV. Answer in Detail

1. What are the complications during pregnancy? Explain.
2. Write on infant mortality rate? Discuss the causes and preventive measures of IMR.
3. Tabulate the ICMR/RDA for infants and discuss the nutritional requirements.
4. Discuss the nutritional requirements of a pregnant woman.
5. Tabulate the respiratory infections, their causes, symptoms and prevention.
6. Name the intestinal infections and discuss under the following heads.

   a) Causes b) Symptoms c) Control and prevention

3. NUTRITION FOR CHILDREN

3.1 Food and Nutrient Requirements of Preschool and School Going Children Ways of Developing Good Food Habits

The growth during infancy is very rapid and followed by a generally slow growth between one to six years. Toddlers eat less food and have less appetite. In the second year and throughout the years of childhood, the child's muscle development is more and begins to lengthen although skeletal growth is slower. Hence during this period the child needs less calories but more protein and minerals for growth. Teething continues from infancy to early childhood.

The preschool period is an excellent time to help the child to become familiar with the idea that eating a proper diet is a part of healthy life style. Attitudes and habits formed during preschool years are likely to be carried on to the future. The mental capacities of the child are also being developed. His growth is fostered by a new environment in school.

Growth pattern: During the second year, the increase in height is about 10cm and weight gain is 2 to 2.5kg. After two years the annual gain in height and weight is only 6 to 7 cm and 1.5 to 2kg respectively. However there is a wide variation in the physical development of the children.

As growth proceeds, changes occur in the proportions of water and muscle tissue, fat deposits and skeletal structure. The body water gradually decreases and there is addition of adipose tissue and that of minerals to bone. Specific nutrients such as protein, calcium and iron are needed. Vitamin A and C are required for growth and development of the tissues. ICMR recommended dietary allowances (RDA) for the preschool children is given in Table 3.1.

Table 3.1: Recommended Dietary Allowances for Preschool Children (ICMR)

Nutrients	1-3 years	4-6 years
Energy (kcal)	1060	1350
Protein (g)	16.7	20.1
Fat (g)	27	25
Calcium (mg)	600	600
Iron (mg)	9	13
Vitamin A		
Retinol (μg)	400	400
Beta carotene (μg)	3200	3200
Thiamine (mg)	0.5	0.7
Riboflavin (mg)	0.6	0.8
Niacin (mg)	8	11
Vitamin C (mg)	40	40
Folic acid (μg)	80	100

Source: Nutrient Requirements and Recommended Dietary Allowances for Indians, ICMR, 2010

Nutritional allowances

1. Energy: Energy is required for growth and activity upto 10 years and there is no difference in sex for dietary allowances. The energy requirement is 1240 kcal for 1-3years and 1690 kcal for 4-6years.

2. Protein: The basal losses and the additional requirement for growth have been considered in determining the allowances for protein. The protein requirement is 22g for 1-3years and 30g for 4-6 years. Protein in diet is supplied by milk, meat, fish, eggs, cheese, dry beans and peas.

3. Fat: To provide sufficient energy density and to improve palatability of the diet 25g of visible fat per day has been suggested. The linoleic acid requirement is 3 per cent of energy allowance.

4. Calcium: Calcium requirements are assessed based on the calcium deposition in the body during the period of growth. It is not uniform throughout the growing period but is relatively higher during early childhood and adolescence. Hence 400mg of calcium per day is recommended. Calcium, needed for strong bones and teeth is primarily found in milk and milk products and to a lesser extent in green leafy vegetables.

5. Iron: Iron requirement is 12 mg/day for 1-3 years and 18 mg/day for 4-6 years. It is an important mineral and can be obtained from meat, poultry, eggs, green leafy vegetables and iron fortified cereals.

6. Vitamin A and C: ICMR has suggested an intake of 400µg of vitamin A per day and 40mg of vitamin C per day. Citrus fruits and their juices and dark green or yellow vegetables are good sources of vitamin A and C.

Foods and feeding: Basic nutritional needs of children are similar to the nutritional needs of other family members. Pre schoolers demand a lot of variety in foods. Sometimes they grab on food, some times they appear as though disinterested in food. A preschool child prefers single food with simple flavours rather than complicated foods and dishes. The child appears to be interested in the texture, colour and form of the food. Finger foods such as raw fruit and vegetables cut into finger size are much acceptable among this age group. The emphasis of the diet should be on quality and quantity. In the nursery and school, group eating habits are developed.

Sugary foods: Provide few nutrients and should be taken on a limited basis. Chewy sticky and sugary foods may promote tooth decay.

The quantities of various food groups to be included in a balanced diet for preschool children is given in Table 3.2.

Table 3.2: Balanced Diet for Preschool Children

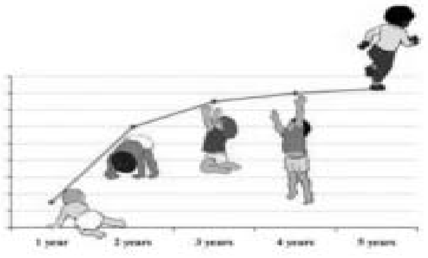
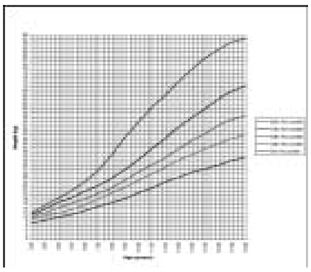
Food groups	Quantity (g)	
	1-3 years	4-6 years
Cereals and Millets	120	210
Pulses	30	45
Milk and milk products	500	500
Roots and tubers	50	100
Green leafy vegetables	50	50
Other vegetables	50	50
Fruits	100	100
Sugar	25	30
Fats / oils (visible)	20	20

Source: Dietary guidelines for Indians- A Manual, National Institute of Nutrition, ICMR, Hyderabad, India 2005.

Psychosocial changes: Psychological changes take place during this period. As the child steps into the second year he develops a sense of individuality which is distinct and is reflected in food behaviour. With advancing age there is an increasing sense of independence, initiative, imagination and curiosity.

Period of imitation: It is a period of imitation and sex identification, with boys imitating their fathers and girls their mothers. Such behaviour is reflected at meal times and therefore parents play an important role in inculcating healthy and positive attitude towards food.

Growth chart: A growth chart is a reliable way to find whether the child's diet is meeting the body needs. Growth chart helps to measure the regular growth of a child which enables to visualize growth or lack of it and obtain specific, relevant and practical guidance to ensure continued regular growth and health of children. These charts are available from pediatricians, public health clinics and child health centres. Since children grow in spurts, their needs vary. Changes in appetite may reflect these needs

Growth Chart

Feeding guide:

The following guide given in Table 3.3 helps to keep the child in developing good eating habits.

Table 3.3: Feeding Guide for the Preschool Child

Food groups	Suggested daily servings	Suggested serving sizes
Vegetables Dark green vegetables Deep-yellow vegetables, Starchy vegetables and Other vegetables	3-5 servings Include all types regularly, serve dark green leafy and deep yellow vegetables often	¼ cup cooked vegetables ¼ cup chopped raw vegetables ½ cup leafy vegetables (eg: spinach)
Fruits All fruits and juices	2 - 4 servings Include citrus fruits or their juices regularly	½ whole fruit such as an apple, banana or orange ½ cup juice ¼ cup cooked or tinned fruit ¼ cup raisins
Cereals, Breads	6-11 servings Including several servings of whole grain products	½ slice of bread ½ bread roll 4 salt biscuit, crackers ¼ cup cooked cereal rice 1/3 cup ready to eat dry cereal ¼ cup hot cooked cereal
Milk, curd, yogurt and cheese	4 servings	½ cup milk or yogurt 20g cottage cheese
Meat, poultry, fish, eggs, dry beans, peas and nuts	3-5 servings	30g cooked lean meat 1 piece fish or chicken ½ egg ½ cup cooked beans 2 tablespoon peanut

Source: National Network for child care - NNCC part of cybernet, The National Extension Service

Food jags and new foods: Most preschoolers experience food jags like eating only a few self-related foods. Food should not become the object of bribes or punishments. If food is rejected, the rejected food can be tried at different times. New foods like finger foods, foods that crunch on crackle when eaten and foods different in texture and flavour are appealing to the child's sense. New foods can be presented at the time when the child is really very hungry. Snacks offered between meals should provide more calories. Some good snack foods include dry cereal with milk, meat or peanut, sandwiches, vegetable or fruit breads, yogurt, oat meal cookies and milk.

Factors responsible for rejecting the food by preschool children

* Sickness of the child
* Worm infestation, particularly hook worm.
* Nutritional deficiency
* Tiredness of the child
* Insufficient time for eating
* Psychologically disturbed child
* Repetetive food, no variety
* Food is not according to the likes of the child
* Unpalatable food,
* Food not at right temperature
* Including snacks just before the meal
* Diversion to play
* Unfavourable comment on food

Reasons for psychological problems among preschool children

* Stress at school
* Absence of father or mother
* Birth of a sibling
* Shifting to a new place
* To draw the attention of parents

Nutrition during school age: During the school age 6 to 12 years the child's growth is not rapid but continues gradually. Boys and girls have to build up resources for the adolescent period. Boys usually grow slower during these pre-adolescent years than girls. Usually girls have higher deposition of body fat as compared to boys of the same age but have less percentage of muscle tissue. At the age of 11-12 years girls become heavier and taller than boys. As the child enters school he/she develops the ability to work out problems and participate in group activities. This is a period of emotional stress, competitive behaviour and dreaming which brings drastic changes in the previous learning and personality pattern. There is a change from dependance of parental standard towards those set by peer group. Though growth rate is slow during school years adequate reserves are laid during this period for rapid growth during adolescence. Hence the age of 6-12 years is being called lull before the storm.

Nutritional requirement:

The nutritional requirement of school going children vary for boys and girls.

1. Energy and protein: The requirements for calories and proteins increase during school age. The calorie requirements remain almost the same for girls throughout. Boys of 10-12 years of age require more calories as adequate reserves are being laid for growth spurt during adolescence. The protein requirements are slightly higher for girls than boys of 10-12 years for the approaching menarche.

2. Fat: ICMR has suggested the desirable visible fat intake of 22g/day for school going children.

3. Minerals: The children in the age group of 10-12 years require more calcium than adults to meet the demands for skeletal growth.

The iron requirement is increased as blood volume increases. Also the mean increase in body weight from second year to the twelfth year in boys and tenth year in girls is 2.5 to 2.7 kg/year which is equivalent to an iron requirement of 0.3mg/day.

4. Vitamins: The recommended dietary allowance of vitamin A and C are same as adults recommendation. The requirement for B vitamins are in proportion with the calorie requirements. ICMR recommended dietary allowances for school going children are given in Table 3.4.

Table 3.4 Recommended Dietary Allowances for School Going Children

Nutrients	7-9 years	10-12 years	
		Boys	Girls
Energy (kcal)	1690	2190	2010
Protein (g)	29.5	39.9	40.4
Fat (g)	30	35	35
Calcium (mg)	600	8	800
Iron (mg)	16	21	27
Vitamin A			
Retinol ((µg)	600	600	600
Beta carotene (µg)	4800	4800	4800
Thiamine (mg)	0.8	1.1	1.0
Riboflavin (mg)	1.0	1.3	1.2
Niacin (mg)	11	13	15
Ascorbic acid (mg)	40	40	40
Folic acid (µg)	80	100	120

Source: Nutrient Requirements and Recommended Dietary Allowances for Indians, ICMR, 2010

Food and feeding: During this period the growth of the child is slow and the requirement of food per unit body weight is less. This decline continues until the preadolescent spurt. Likes and dislikes may have developed in the earlier years. Eating of snacks, especially in the mid afternoon becomes increasingly common and it is here, that the mother's role gain importance in offering a wide variety of nutritious meals and snacks.

Diet: By school age, most of the children establish a particular pattern of food intake. The children may try new foods which they normally do not consume. Breakfast is the very important meal. Children are generally restless and spend very little at the table. Skipping breakfast affects their performance level and the calorie and nutrient loss cannot be made up at any other time during the day. Menu must include dishes that are quick to eat yet nutritionally adequate. Also there should be variety in colour, texture and taste. Balanced diet for school going children is given in Table 3.5.

Table 3.5: Balanced Diet for School Going Children

Items	Quantity (g)		
	7-9 years	Boys (10-12 yrs)	Girls (10-12 yrs)
Cereals	270	330	270
Pulses	60	60	60
Milk and milk products	500	500	500
Roots and tubers	100	100	100
Green leafy vegetables	100	100	100
Other vegetables	100	100	100
Fruits	100	100	100
Sugar	30	35	30
Fats/oils (visible)	25	25	25

Note: For non vegetarians 30 g of pulse can be exchanged with 50g of meat/chicken/fish.

Feeding problems: Many of the school children consume inadequate diet and so they are malnourished and become underweight. Psychological factors contributing to depression may lead to malnourishment. Less consumption of food, hurried eating and lack of sleep may also lead to constipation.

Making healthful choices: As children grow up, they become more independent about choosing their food. Children can be made to make healthful choices by

* Parents being role models.
* Making them to plant vegetable or fruit trees (children take pride in eating foods they have grown)
* Taking them to farmers market.
* Allowing them to plan the dinner menu with the help of food guide pyramid.
* Encouraging them to prepare simple recipes
* Appreciating when children make healthful food choices.

Packed lunch: Packed lunch have become a necessity for school children as it is not possible to have lunch at home. It is the lunch packed in tiffin box to be eaten by the child while away from home.

Taking lunch from home needs a little effort, but helps in maintaining good health. Carrying food from home is less expensive, more convenient, more hygienic and meets the individual requirements.

Points to be considered while planning packed lunches

1. It should meet one third of daily requirement of calories and protein of the child.
2. The packed lunch should include food from all basic five food groups though the number of dishes may be less.
3. At least one serving of green leafy vegetables should be included.
4. Food stuffs providing good quality protein like egg, milk or milk product like paneer or curd would improve the overall protein quality in combination with vegetable protein.
5. Monotony should be avoided, variety should be introduced.
6. Include whole fruit to make the lunch appetising
7. Preferably the food packed should be different from that prepared for breakfast.
8. The dishes should be packed at right consistency so as to avoid leakage or dryness of food which may not be appetising to the child.
9. Fruits or vegetable salad may be included every day.

Some examples of packed lunch

1. Vegetable pulav, onion raita, boiled egg, orange,
2. Sambar rice, amaranth poriyal, vegetable salad and butter milk.
3. Chappathi, potato masal, orange

Children Eating Packed Lunch

Healthy eating food habits for children

Teaching good food habits for children helps to maintain lifestyle when they are adults.

1. Guide your child: Make a wide variety of healthful foods available in the house which will help the child to learn healthy food choices.
2. Eat meals together: Meal times should be pleasant with conversation and sharing and not a time for scolding or arguing.
3. Involve the child in shopping: Involving child in shopping and preparation considering childs food preferences will give an opportunity to teach the children about nutrition.
4. Encourage the child to eat slowly: The child’s hunger or fullness can be detected easily.
5. Plan for snacks: Continuous snacks may lead to overeating. Nutritious snacks given at specific time during the day will not spoil the child’s appetite.
6. Discourage eating meals or snacks while watching television.
7. Encourage children to drink water as their beverage: Over consumption of sweetened drinks may increase the rate of obesity.

8. Do not use food for punishing or rewarding children: Withholding food as a punishment may lead children to worry. Similarly when foods such as sweets are used as a reward may lead the children for wrong assumption that these are more valuable foods than others.
9. Include variety of foods: Offering a variety of healthy foods will make children to eat what they need.
10. Include variety of colours and textures: This will create interest and increase the number of foods the child will accept.

Suggestions for preventing food dislikes

1. Never discuss food fads in front of the child
2. No personal dislikes should be shown in front of the child
3. Avoid giving new food when the child is tired.
4. Avoid giving too much liquid in between the meals.
5. Avoid too much of fried food on account of fat it contains.
6. Avoid tea, coffee, vinegar, alcohol and pickle for children.

Taking into consideration of the above facts a healthy sample menu for a school going child is shown in Table 3.6.

Table 3.6: Menu Plan for a School Going Child

Time	Items	No. of serving
Breakfast	Idli/dosai Egg omlette Fruit milk shake	2 1 1 glass
Lunch	Potato paratha Dhal with greens Rice Curd Cucumber raitha	1 medium ½ cup ½ cup 1 cup ½ cup
Snacks	Milk Cornflakes/oats/ragi porridge Mixed grain porridge Banana/any seasonal fruit	1 cup ½ cup ½ cup 1
Dinner	Phulka Mixed vegetables curry Rice Dhal	2 1 cup ½ cup 1 cup
Bed time	Milk	1 glass

3.2. Integrated Child Development Services (ICDS) Programme

The Integrated Child Development Services (ICDS) Programme of the Department of Women and Child Development and Ministry of Social Welfare Government of India was started in 1975 and has emerged as the world's most unique and largest early childhood development programme. ICDS which started as a social experiment with 33 projects has emerged as a social experience to reach the unreached. It is a viable vehicle for achieving major national nutrition health and education goal embodied in the National Plan of Action for children in1992.

It is a multi sectoral programme and services are co-ordinated at the village, block, district, state and central government levels. The programme provides an integrated approach for converging all the basic services for improved child care. ICDS programme is to improve the nutrition and health status of underprevileged section of the population through direct intervention mechanism. The programme covers 27.6 million beneficiaries with supplementary nutrition.

Main Objectives of ICDS Programme:

- Lay the foundtion for proper psychological, physical and social development of the child
- Improve the nutritional and health status of children below the age of six years.
- Reduce the incidence of mortality, morbidity, malnutrition and school dropouts
- Achieve effective co-ordination of policy and implementation among various departments to promote child development
- Enhance the capability of the mother to look after the normal health and nutritional needs of the child through proper health and nutrition education.

Implementation of ICDS Programme: ICDS programme provides various services to 0-6 years old children and mothers as follows:

- Supplementary feeding.
- Immunization against preventable childhood diseases
- Health checkups and referral services
- Health and nutrition education to adult women
- Pre-school education to 3-6 year olds

All the ICDS are delivered through a centre, the anganwadi by a trained village women who is assisted periodically in the health tasks by an Auxillary Nurse Midwife (ANM) from the health sub center. This scheme is targeted only for people from poor families.

Target group

The beneficiaries of this programme are

- Children below one year
- Children between 1-5 years
- Pregnant and nursing mothers

Components of the Scheme

1. Supplementary nutrition: Sathumavu is given to children below two years of age and to nursing and expectant mothers from low income families.

2. Immunisation: Immunisation against tuberculosis, diphtheria, whooping cough, tetanus and measles and polio myelitis for all children under one year of age.

3. Prophylaxis against vitamin A deficiency: Children in the age group of 1-5 years receive 2,00,000 IU of vitamin A solution orally every six months.

4. Nutrition and Health education

5. Health check ups: Frequent health check ups are done by the medical officers.

School Lunch Programme

Increasing urbanisation and number of working mothers have made school days longer. Improper and hurried meals at home have become a routine. Whereas among rural population, young children are sent for work to earn a living and dropout rate is higher among children at primary and secondary school level. These factors have created necessity to provide lunch at schools which will provide nutritious food to children and also reduce the drop out rate.

The school lunch programme operate with the following objectives: To

- provide food to the undernourished child and improve the nutritional status
- increase school enrolment and attendance
- inculcate good food habits
- incorporate nutrition education as part of the curriculum
- improve the educational performance of the students
- encourage use of locally available nutritious foods
- encourage community participation in the feeding programme.

Nutirtious Noon Meal Programme (NNMP)

The noon meal programme was launched on July 1, 1982 by the late Dr.M.G. Ramachandran the Chief Minister of Tamilnadu. The nutritious noon meal programme was started initially in the rural areas and was then extended to the urban areas. Covering all children upto 15 years as well as old age pensioners were brought under this "beneficiary net". This programme comes under Social Welfare Department.

The two major nutrition intervention programmes currently in operation for the population below poverty line in Tamil Nadu are Nutritious Noon Meal Programme (NNMP) of Government of Tamil Nadu and the Integrated Delhi Development Service (ICDS) sponsored by the Ministry of Social Welfare, Government of India.

The operation details of the two programmes is presented in the following Table 3.7.

Table 3.7: Nutrition Intervention Programme Operated by Government

Details	Beneficiaries	Foods given	Nutrient contribution
ICDS 2nd October 1975	1. Children of 6 months to 4 years of age 2. Pregnant and lactating mothers	1. 6 months - 2 years 80g Sathumavu 2. Normal I, II and III grade malnutrition - 160g Sathumavu 3. 2-4 years Rice - 80g Oil - 2g, dhal - 5g 4. Pregnant and lactating mothers - 120g Sathumavu	300 kcal and 9 g protein 600kcal and 18g protein 350 kcal and 7g protein 500kcal and 15g protein
Nutritious Noon Meal Programme (NNMP) 1st July 1982	1. Children of 2 to 15 years 2. Pregnant and lactating mothers	1. 6 months - 2 years 80 g Sathumavu 2. 2-15 years 80g rice, 10g dhal, 2g oil. In addition to this each child gets 18 paise towards vegetable and grocery every day. 20g potato/greengram / bengal gram, once a week/egg 3. Pregnant and lactating mother - 720g Sathumavu/ week	One third of daily requirements of calories and protein

* Composition of Sathumavu per 100g

Wheat	-	35g
Ragi	-	21.5g
Roasted bengal gram	-	11g
Jaggery	-	32.5g

3.3. Prevalence of Protein Energy Malnutrition (PEM) Vitamin A Deficiency, Anaemia and Dental Caries

The primary cause of malnutrition is inadequate and faulty diet. Apart from these poverty and other socio-economic factors, environmental factors also play an important role in aggravating the dietary deficiency diseases. Other factors include chronic diseases, poor environmental sanitation and poor personal hygiene. The prevalence rate of malnutrition among children is given in Table 3.8.

Table 3.8: Prevalence of Malnutrition among Preschool Children and Infants

Aspects	Prevalence (%)
Low birth weight	30
Kwashiorkar / Marasmus	1-2
Bitot's spot	3
Iron deficiency anaemia	50
Under weight (weight for age)	53
Stunting (height for age)	65

Source: Dietary Guidelines for Indians - A Manual

National Institute of Nutrition, ICMR, Hyderabad 2005.

About 1-2% pre school children suffer from PEM like Kwashiorkar and marasmus. In case of vitamin A deficiency, upto 3% of preschool children show Bitot's spots and night blindness and about 30-40 thousand children become blind every year. Vitamin A deficiency also increases the risk of disease and death. More than 50% preschool children also suffer from anaemia.

Protein Energy Malnutrition (PEM)

Protein energy malnutrition is one of the largest public health problems of our country. As the name suggests this condition is a deficiency of protein and calories in the diet. It is not a disease but a condition arising from an inadequate diet.

Protein energy malnutrition is a disease of the poor, undernourished word chronically ill patient. This is characterized by the imbalance between the supply of nutrient and energy and the body's demand for them to ensure growth and maintenance of health and functions of the body.

There are 3 types of PEM

1. Marasmus - deficiency of both energy (carbohydrate) and protein
2. Kwashiorkar - deficiency of protein
3. An-intermediate state of marasmus and kwashiorkar.

1. Marasmus: The term is derived from the Greek word meaning "to waste". Most commonly occurs in children below 5 years and failure to thrive is a common feature.

Symptoms:

- Poor weight gain and weight loss
- Short in height for age - stunting
- Gross muscle wasting and loss of subcutaneous fat
- Irritation, anxiety and apathy
- Wrinkled skin, dry and loose like tissue paper
- Behavioural changes and decreased responsiveness

2. Kwashiorkar: It is also called as the disease of weaning as it appears during the period of weaning in a child when the mother fails to supplement the proteins required but feeds the cereals and malt which are rich in carbohydrates but poor in proteins.

Symptoms

- Odema of the whole body especially belly - pot belly
- Moon face
- Wasted muscles
- Retarded growth
- Fatty liver - Hepatomegaly
- Hair changes
- Skin changes
- Nail plates are thin, soft and fissures

3. Marasmic Kwashiorkar: As the name implies, this is a combination in varying degrees of the features of the two conditions. Marasmus and Kwashiorkar, associated symptoms like gastro intestinal disorders or respiratory disturbances, angular stomatitis, and xerophthalmia are also seen.

The peak prevalence of protein energy malnutrition is observed in the age group of 2-3 years and marasmus between 1-2 years. Over 80% of under fives are estimated to be malnourished and 1-2% suffer from severe malnutrition. More than 50% of deaths in children is attributed to malnutrition either directly or indirectly.

NNMB survey among rural children reveals that only 10% are normal with weights above 90% of the standard weights. A majority of the children exhibit mild or moderate malnutrition while 7-8% are severely malnourished.

About 1-2% of preschool children suffer from severe form of PEM namely Kwashiorkar and marasmus and more than half of the Indian preschool children from sub-clinical undernutrition manifested by low weight for age. About 65% of them are stunted which indicates under nutrition of long duration.

Treatment

1. Hospital treatment: The following conditions should be corrected - Hypothermia, hypoglycaemia, infection, dehydration, electrolyte imbalance, anaemia and other vitamin and mineral deficiencies

2. Dietary Management: The diet should be from locally available staple food, inexpensive, easily digestible, evenly distributed throughout the day and increased number of feedings to increase the quantity of food.

3. Rehabilitation: The concept of nutritional rehabilitation is based on practical nutritional training for mothers in which they learn by feeding their children back to health under supervision and using local foods.

Prevention:

- Promotion of breast feeding
- Development of low cost weaning
- Nutrition education and promotion of correct feeding practices
- Family planning and spacing of births
- Immunization
- Food fortification
- Early diagnosis and treatment

II Vitamin A deficiency: Inadequate dietary intake of vitamin A or its precusor (beta carotene) is the most contributory factor for vitamin A deficiency.

A child suffering from a deficiency of vitamin A first displays the following symptoms.

- Night blindness
- Bitot's spots
- Dryness in the conjunctiva then leading to Xerophthalmia
- Total blindness or keratomalacia

Vitamin A deficiency is exhibited as Bitot's spots in 3 percent of school children and 30-40 thousand children become blind every year. Vitamin A deficiency increases the risk of disease and death.

Vitamin A deficiency

III. Anaemia: This is caused by lack of dietary iron or inadequate absorption and utilization of iron.

Causes of Anaemia

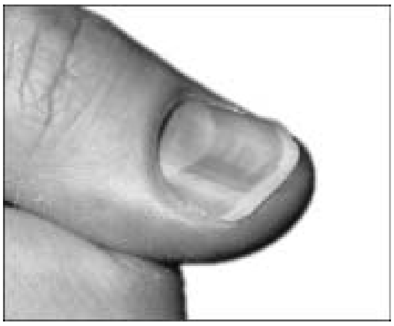
A. Blood loss

- Accidental haemorrhage
- Chronic disease, cancer or ulcer
- Excessive menstrual loss
- Worm infestation - parasites like hook worm

B. Deficiency of iron in diet

C. Decrease in absorption of iron due to diarrhoea, lack of acid secretion by stomach.

The symptoms include:



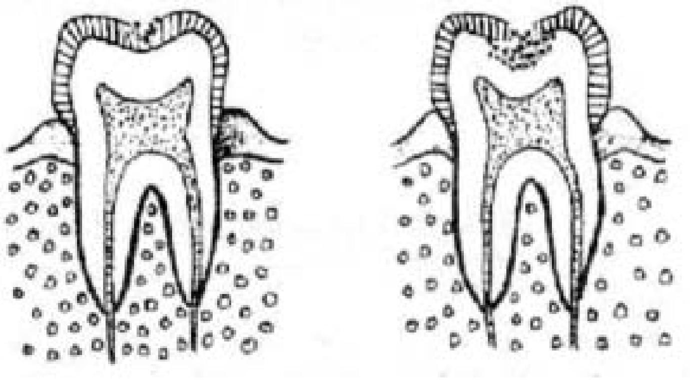
- Pale skin
- Spoon shaped nails or koilonychia
- Atrophy of papillae of tongue, glossitis
- Angular stomatitis and dysphagia
- Gastritis resulting in achlorhydria

Long term deficiency results in malfunctioning of various systems. The general symptoms are fatigue breathlessness or exertion, dizziness, headache, dimness of vision, insomnia and angina.

IV. Dental Caries

Tooth decay can be caused by caries. This can occur in children who are susceptible to and whose integrity of tooth structure may be affected by nutritional deficiency. Vitamin A and C are essential for dentine. Calcium, phosphorus and vitamin D are needed for calcification. Fluorine decreases susceptibility of caries. Fermentable carbohydrate which adheres to the tooth is the major cause of tooth decay. The sticker the food and longer it stays in the mouth the greater is the effect. Thorough cleaning of mouth after each meal and developing the habit of brushing twice a day, early morning and before bed, might prevent dental caries.

The high prevalence of these nutrient deficiency diseases stress the need for a balanced, nutritious diet during preschool years. Infancy and pre school years are extremely



Dental Caries

Questions

PART - A

I.A) Choose the Correct Answer

1. The annual gain in height after two years is ____________
   a) 6 to 7 cm b) 5 to 6 cm c) 7 to 8 cm
2. At the age of ____________ years girls become heavier and taller than boys.
   a) 11-12 years b) 12 to 13 years c) 13-14 years
3. ____________ is given to children below two years of age and to nurshing and expectant mothers from low income families
   a) Sathumavu b) Kulandai Amudhu c) Amirtham
4. The noon meal programme was launched on ____________ by the late Dr. M.G.Ramachandran, Chief Minister of Tamil Nadu.
   a) July 1, 1982 b) June 1, 1982 c) July 1, 1983
5. The primary cause of malnutrition is ____________ diet.
   a) Inadequate b) Faulty c) Inadequate and faulty
6. Marasmus is derived from the greek word meaning ____________
   a) Waste b) Poor c) Inadequacy
7. The precursor of vitamin A is ____________
   a) Beta carotene b) Citric acid c) Folic acid
8. Deficiency of iron in a diet leads to ____________
   a) Bitot's spot b) Anaemia c) Scurvy
9. Tooth decay can be caused by a lack of ____________
   a) Iron b) Fluorine c) Calcium
10. Vitamins essential for dentine in teeth are ____________
    a) Vitamins A and C b) Vitamins B and C c) Vitamins D and C

B). Answer in one or two sentences

1. What is the iron requirement for a 1-3 years old child?
2. Define growth chart.
3. Which age is called as lull before the storm.
4. Write about packed lunch.
5. Expand ICDS.
6. Write the three types of PEM.
7. Write 2 examples of packed lunch.
8. Write about sugary foods.

9. Periods of imitation - Mention the period.
10. Identify the foods responsible for major tooth decay.

PART - B

II. Answer in five lines

1. Tabulate a balanced diet for 1-3 year old child.
2. List the factors that cause psychological disturbances to the child.
3. How will you choose healthful choices for children.
4. Discuss any 5 points to be considered while preparing packed lunch.
5. State the objectives of ICDS programme.
6. List the composition of sathumavu per 100g.
7. Suggest any five healthy eating food habits for children.
8. Write down the symptoms of marasmus.
9. What are the symptoms of vitamin A deficiency?
10. List the causes of anaemia.
11. Write short notes on food jags and new foods.
12. Write about psychosocial changes in children.
13. Identify the feeding problems in children.

PART - C

III. Answer should not exceed one page

1. Give the Recommended Dietary Allowances (RDA) for pre school children.
2. List the points to be considered while planning packed lunches.
3. How will you develop healthy food habits among children?
4. Plan a day's menu for a school going child.
5. Enumerate the objectives of school lunch programme.
6. What is Kwashiorkar? Write the clinical symptoms.
7. Explain the treatment to be undertaken for a PEM child.
8. Tabulate the nutritional deficiency diseases among the preschool children and infants.
9. List the factors responsible for rejecting food by preschool children.
10. Tabulate the nutrition intervention programmes operated by Government.

PART - D

IV. Answer in Detail

1. Tabulate a feeding guide for the preschool child.
2. Write the details on ICDS - Objectives, implementation and target group.
3. Who is a marasmic child? Explain the clinical symptoms and treatment strategy.

4. THERAPEUTIC DIET

4.1. Dietary Management for Diseases – Fever, Gastrointestinal tract – Peptic ulcer, Diarrhoea, Constipation, Liver diseases – Jaundice and Hepatitis.

Dietary Management for Various Diseases

The alteration of the normal diet requires an appreciation of the underlying disease condition which require change in the diet, the possible duration of the diseases, and the patients tolerance for food by mouth. In planning meals for a patient his economic status, his food preferences and his occupation and time of meals should also be considered. The normal diet may be modified to provide change in consistency as in fluid and soft diets to increase or decrease the energy value, to include greater or lesser amounts of one or more nutrients, for example, high protein, low sodium, high and low fibre diets and to provide foods bland in flavour.

Dietary history should serve as the basis for planning each diet. The dietary history will reveal the patient's past habits of eating with respect to dietary adequacy, likes and dislikes, meal hours, where meals are eaten, budgetary problems, ability to obtain and prepare foods. The likes and dislikes of patients are respected because food habits are deep-seated and it is not possible to change them overnight. Intelligent planning of therapeutic diets necessitates a consideration of food costs, the avoidance of waste, and retention of nutrient values so that diet is economically practicable.

I. Fevers

Fever is a classic sign of infection, although not all fevers are caused by infection. Fever is an elevation in body temperature above the normal (98.4^{o}F) which may occur due to exogenous and endogenous factors.

Causes

Endogenous factors: Antigen, antibody reaction, malignancy and allergy.

Exogenous factors: Bacteria or fungi

Development of fever due to exogenous agents is shown in the following figure.

Infection due to bacteria or fungi

↓

Activation of phagocytes in the bone marrow

↓

Release of pyrogen (Fever indicating hormone)

↓

Synthesis of prostaglandins

↓

Thermoregulatory centre in the anterior hypothalamus

↓

Increase in temperature

Metabolic results of elevated body temperature

Increase in BMR 7% for every ºF or 13% for every ºC

Increase in breakdown of body proteins

Increase in loss of body water, sodium and potassium

Decrase in glycogen and adipose tissue stores.

Types of Fever:

- Short duration fever : Cold, tonsillitis, influenza and typhoid
- Chronic fever : Tuberculosis
- Intermittent fever : Malaria

General dietary considerations

Energy: The caloric requirement may be increased by as much as 50 percent if the temperature is high and the tissue destruction is great. Restlessness also increases the calorie requirement. Initially, the patient may also be able to ingest only 600 to 1200 k.cal. daily but this should be increased as rapidly as possible.

Protein: About 100g of protein or more is prescribed for the adult when fever is prolonged. This will be most efficiently utilized when the calorie intake is liberal. High protein beverages may be used as supplements to regular meals.

Carbohydrate: Glycogen stores are replenished by a liberal intake of carbohydrates. Glucose which is less sweet and readily absorbed into the blood stream is preferred.

Fats: The energy intake may be rapidly increased through the judicious use of fats but fried foods and rich pastries may retard digestion unduly.

Minerals: A sufficient intake of sodium chloride is accomplished by the use of salty broth and soups and by liberal sprinklings of salt on food. Fruit juices and milk are relatively good sources of minerals.

Vitamins: Fevers apparently increase the requirement of vitamin A and ascorbic acid just as the B complex vitamins are needed at increased levels. Oral therapy with antibiotics and drugs interfere with synthesis of some B-complex vitamins by intestinal bacteria, thus necessitating a prescription for vitamin supplements for a short time.

Fluid: The fluid intake must be liberal to compensate for the losses from sweat and to permit adequate volume of urine for excreting the wastes. Daily 2500-5000 ml is necessary, including beverages, soups, fruit juices and water.

Ease of digestion: Bland, readily digestible food should be used to facilitate digestion and rapid absorption. The food may be soft or of regular consistency. Fluid diets can be used initially, if it is continued the following disadvantages may occur:

1. Most fluid diets occupy bulk, out of proportion to their caloric and nutrient values, so that reinforcement with solids is essential.
2. A liquid diet sometimes increases abdominal distention to the point of acute discomfort, whereas solid foods may be better tolerated.

3. Many patients experience less anorexia, nausea and vomiting when they take solid foods.

Intervals of feeding

Small quantities of food at intervals of 2 to 3 hours will permit adequate nutrition without overtaxing the digestive system at anytime. With improvement, many patients consume more food if given in three meals and bedtime feeding.

The duration of many fevers have been shortened by antibiotic and drug therapy and nutritional needs are usually met without difficulty. During an acute fever the patient's appetite is often very poor and small feedings of soft or liquid foods are desired and should be offered at frequent intervals. Sufficient intake of fluids and salt is essential. If the illness persists for more than a few days, high protein, high calorie foods need to be emphasized.

Foods to be included and excluded during fever

Foods to be included	Foods to be excluded
Fruit juices with glucose, tender coconut water, milk, milk shakes - if there is no diarrhoea, thin dal, curries, eggs, baked fish, minced meat, cottage cheese, curds, gruels, steamed vegetable juices, vegetable puree.	Butter, ghee, irritating fibre foods, chillies and other spices, rich pastries, fried foods, puddings and cream soups.

a) Typhoid : Typhoid is an infectious disease with an acute fever of short duration and occurs only in humans. Salmonella typhi causes typhoid. Faeces and urine of the patients are the carriers of the disease and the main sources of infection. Drinking water or milk and food contaminated by intestinal contents of the patients or 'carriers' or by flies which often transmit the disease.

Signs and Symptoms:

- High inflammation of the intestine,
- Formation of intestinal ulcers
- Haemorrhage
- Enlargement of spleen.
- Diarrhoea, constipation and severe stomach ache.
- Headache and aneroxia

Principles of diet : A high calorie, high protein, low fat, high fluid, low fibre and bland diet is suggested for typhoid patients.

Dietary Management:

- The general principles of dietary treatment of fever is followed for typhoid also.
- At first a clear fluid diet followed by full fluid and soft diet is suggested.

- On liquid diets alone the patient may not meet high calorie and high protein requirements. When the patient is improving soft diet can be given.
- The febrile period may upset water balance and liquid diets are helpful in meeting water and electrolyte requirements.
- Because of the intestinal inflammation, great care must be exercised to eliminate all irritating fibres and spices in the diet.
- Refined cereals, porridge, bread, eggs, boiled potato and simple desserts like custards, can be given.

A Model Menu plan for Typhoid patient

Early Morning	Tea - 1 glass
Breakfast	Bread - 2 slice with butter Egg - 1, Banana - 1
Lunch	Chappathi - 1, Rice - 1 cup, Dhal - 1 cup, Vegetable boiled - 1 cup, Curd - 1 cup
Tea time	Orange juice or coconut water - 1 cup, Rava uppuma - ½ cup
Dinner	Chappathi - 1 / phulkas - 2, Rice - 1½ cup, Green gram dhal masiyal - 1 cup Yellow pumpkin curry - 1 cup Curds - 1 cup
Bedtime	Milk - 1 glass

Note:

- Vegetables such as potato, yellow pumpkin can be used. Omit other vegetables containing excessive fibre and green leafy vegetables.
- Improve protein value of the diet by using protein supplements such as protinex, protinules etc.

b) Tuberculosis

Tuberculosis is an infectious disease caused by the Bacillus Mycobacterium tuberculosis. It affects the lung most often but may also be localised in other organs such as the lymphnodes, intestine, bones and joints.

Symptoms and Signs

- Wasting of tissues
- Exhaustion
- Cough
- Expectoration, cough with respiratory secretions
- Fever

- As the disease progresses the patient's blood vessel is eroded in the lungs, death ultimately results when excessive damage has occurred in the lungs.

Principles of diet: A high calorie, high protein, high vitamin and minerals, high fluid and soft diet is recommended.

Dietary Management

- Since patients have poor appetite initially food must be appetizing and patient's likes and dislikes must also be considered.
- During the acute state a high calorie, fluid and soft diet are prescribed.
- Initially small quantities of fluid diet should be given once in three hours. When the fever comes down the interval can be increased to 4 hours.
- High calorie and high protein diet should be given. One litre of milk and 3 to 4 eggs per day are given.
- As the patient progresses, normal, attractive and palatable food should be given. The patient should come back to ideal body weight. Rest, fresh air and good nutrition are the key elements for recovery from tuberculosis.

24th March is World Tuberculosis Day

A model menu plan for a Tuberculosis patient

Early morning	Tea - 1 glass / fresh neera (Unfermented toddy)
Breakfast	Egg nog - 1 glass, Banana - 1 Medium
Mid morning	Cheese sandwich - 1, Sweet lime / Orange juice - 1 glass
Lunch	Chappathis – 2, Rice – 1 cup, Dhal – 1 cup, Cabbage curry - ½ cup, Curd – 1 cup
Tea Time	Tea - 1 glass, Egg Sandwich - 1
Evening	Fruit milk shake - 1glass
Dinner	Cream of tomato soup - 1 cup, Vegetable salad (Carrot, lettuce,beetroot, radish) - 1 cup, Vegetable pulao - 1 cup,Chappathis - 2, Palak paneer - 1 cup, Curd - ½ cup

II. Diseases of the gastro-intestinal tract

- Digestive disorders are among the most common problems in health care management. Approximately 30 to 40 per cent of adults claim to have frequent indigestion.
- Dietary habits and specific food types can play a significant role in the onset, treatment and prevention of gastro intestinal disorders. In many cases, diet play a

main role in improving patient's sense of well-being. The common problems like hyperacidity, ulcers, gastritis, diarrhoea, dysentery and constipation, are discussed below.

a) Peptic Ulcer

This is known as a disease due to hurry, worry and hot curry. Smoking, alcohol intake in large amounts, use of some drugs for a long duration are some of the predisposing factors. Recently a bacteria Helicobacter pylori has been identified as the cause of most cases of peptic ulcer disease. Peptic ulcer is a term used to describe any localized erosion of the mucosal lining of those portions of the alimentary tract that come in contact with the gastric juice.

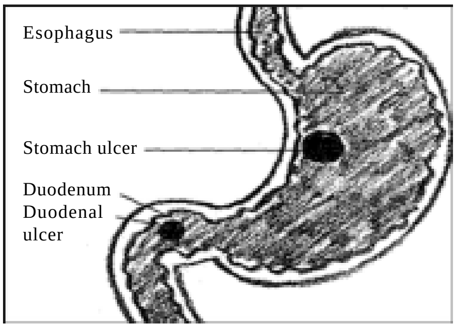
Most ulcers are formed in the duodenum which is part of the small intestine into which food first passes from the stomach. Ulcers also occur in the oesophagus and stomach. Whatever be the location of the ulcer in the gastro intestinal tract, the symptoms that are produced by the ulcer are similar. Hence dietary treatment is same for all the gastro – intestinal ulcers.

Causes

- **Bacterial infection**: Helicobactor pylori is the chief cause of ulcer.
- **Genetic factors:** It is common in persons with blood group 'O' than in those of other groups.
- **Sex**: Men are affected two or three times more frequently than women.
- **Age**: The incidence is high between 20 and 40 years though the average age of incidence has increased. During these years career and personal striving are at a peak.
- **Stress**: People who are highly nervous and emotional and who worry, fear and feel anxiety are particularly susceptible.
- **Potentially irritant substances**: Caffeine, aspirin and nicotine may delay healing of ulcer. Chillies, pepper, ginger, garam masala, meat soups and protein rich foods increase the secretion of hydrochloric acid and aggravate the condition.

Symptoms

- Person feels extremely hungry within one to three hours after meals.
- Abdominal distention and pain
- Burning and piercing pain
- If haemorrhage (blood loss) occurs it may require surgery.
- Other complications of ulcer are gastro intestinal obstruction, perforation and carcinoma.



Treatment

- To relieve the symptoms
- To heal the ulcers
- To prevent complications like surgery.

Principles of diet

Bland diet is suggested for ulcer patients. Bland diet is mechanically, chemically and thermally non-irritating. For optimum overall nutritional intake, milk should be included as a source of nutrient factors for healing purpose and moderate fat.

Dietary management

- The diet should be aimed at avoiding "Dumping syndrome" ie., avoiding sudden entry of large volumes of solids and liquids into stomach.
- It is advisable to have frequent small meals – avoid drinking liquid with meals.
- Moderate use of seasoning is permitted.
- The diet should be planned in consultation with patient taking into consideration of his food preferences, dietary pattern and economic status.
- Meals should be eaten in a relaxed atmosphere and should forget personal or family problems while eating.
- A short rest before and after meals may be conducive to greater enjoyment of meals.
- Smoking and drinking alcohol should be avoided particularly on empty stomach.
- Good physical and mental health is basically needed.

Foods to be avoided and excluded during peptic ulcer is given in Table 4.1.

Table 4.1: Foods to be Included and Excluded in Peptic Ulcer

Foods included	Foods avoided
Beverages - all milk beverages, light tea	Alcohol, carbonated drinks, coffee and strong tea
Cereal - Bread, rice, refined cereals, puffed rice, double sieved flour	Whole grain bread, chappathis.
Eggs - exception in fried forms	Fried eggs.
Fats - in moderate amount Emulsified fats like butter are preferred.	All fried, spiced and preparations containing chillies.
Meat, fish and poultry - lean, tender, boiled, baked, stewed or minced.	All fatty meats, salty, smoked or fried
Pulses - well cooked and mashed	Legumes with skin
Milk - permitted in any form	Nuts: all types All sweets containing rich amounts of chocolate, nuts and sugar.
Vegetables - gourds, brinjals, potatoes, ladiesfinger.	All strongly flavoured vegetables such as cabbage, cauliflower and peas.

A Model menu plan for Peptic ulcer patient: In every 2 hours interval

Light tea - 1 glass
Bread with butter - 2 slices
Poached / boiled egg - 1
Plain milk - 1 glass
Rice - ½ cup
Mashed dhal - ¼ cup
Biscuits - 2
Light tea - 1 glass
Banana - 1
Rice porridge - 1 cup
Phulkas - 2
Pumpkin curry - ¼ cup
Apple milk shake - 1 glass

b) Diarrhoea

Diarrhoea is the passage of stools with increased frequency, fluidity or volume compared to the usual for given individual . Diarrohea is one of the most common and dangerous ailments affecting small children.

Causes

- Overeating or eating foods difficult to digest, infection in intestinal tract, nervous irritability and excessive intake of laxatives.
- Entry of Parasites, bacteria or toxins through food and water.
- Allergies to certain substances or foods such as milk, wheat, egg and sea foods.
- Emotional strain or stress in adults and fear in children.
- Antibiotics and some drugs can cause diarrhoea.

Types

Diarrhoea occurs as a symptom of some functional or organic diseases. It may be acute or chronic in nature.

1. Acute diarrhoea

This is characterized by the sudden onset of frequent stools of watery consistency accompanied by abdominal pain, cramps, weakness and sometimes fever and vomiting. Acute diarrhoea may also be due to some infection such as gastro-enteritis or ulcerative colitis.

2. Chronic diarrhoea

Diarrhoea can be termed chronic when it persists for two weeks or sometimes even longer. The food is passed very rapidly through the small intestine thereby not allowing any time for the nutrients to be absorbed. This results in nutritional deficiencies.

Symptoms and Signs

- Dehydration especially in infants
- Water and electrolyte losses
- Severe thirst, very little output of urine
- Drying up of the mouth
- Loss of skin elasticity.

Treatment

An effective preventive measure would be to start oral rehydration therapy (ORT). Oral rehydration therapy based on the administration of correct oral fluids while allowing food intake, provides a balanced water and electrolyte replacement at low cost and saves lives. Rehydration with fluids improves appetite, allowing better feeding and continued weight gain.

The oral rehydration powder formula as recommended by WHO/UNICEF is given below:

Sodium chloride	:	3.5g
Sodium bicarbonate	:	2.5g
Potassium chloride	:	1.5g
Glucose	:	20.0g
Water	:	One litre

Home made solution

At the first sign of diarrhoea a simple formula can be made at home. For one glass of boiled cooled water one pinch of salt and one teaspoon of sugar can be added, mixed thoroughly and used.

Table 4.2 gives oral rehydration formula for prevention and cure of dehydration.

Table 4.2: Oral Rehydration formula

Mix 20g glucose or 40g sugar mixed in one litre of boiled and cooled water
(or)
Add 50g (or 2 heaped tablespoons) rice powder in one litre of water and boil for 4-5 minutes.
Add
Sodium chloride - 3.5g (or ½ teaspoon of common salt)
Sodium bicarbonate - 2.5g (or ½ teaspoon of soda bi carbonate)
Potassium chloride - 1.5g (or a little lemon juice)

Give atleast 4-6 glasses per day. The rice formula can be kept at room temperature for 5-6 hours and in a refrigerator for 24 hours.

Source: Booklet on Dehydration During Diarrhoea, Published by Glindia (Glaxo Laboratories India Ltd).

Principles of Management

Because diarrhoea is a symptom of a disease, the aim of medical treatment is to remove the cause. The next priority is management of fluid and electrolyte replacement and finally attention to nutrition concerns. Fats are restricted with liberal amount of vitamins and minerals and a low residue diet.

Dietary Management

- Juices of pomegranate, orange, buttermilk or coconut water and sugar can be given to meet adequate supply of fluid.
- Avoid milk and sugar.
- Carrot soup can be given. It supplies water to combat dehydration, replenishes sodium, potassium and phosphorus.
- Bananas contain pectin and encourage the growth of beneficial bacteria.
- After the patient stabilizes, he can be given water, coconut-water, tea, buttermilk and rice water. If the patient is able to eat, he can be given ripe bananas, soft cooked rice, curds and bread.
- Breast feeding of the infant should be continued throughout.

A model menu plan for Diarrhoea

Early morning	Tea - 1 glass
Breakfast	Bread - 1 slice with butter, Banana - 1 or peeled apple.
Mid morning	Butter milk - 1 glass
Lunch	Chappathi - 1 with dhal (or) Rice - 1cup, Softly cooked potatoes or carrots. - ¼ cup
Afternoon	Tender Coconut water - 1 glass
Evening	Biscuits - 2
Dinner	Chappathi without oil - 2, green gram dhal masiyal - ½ cup, curd - 1 cup, Ripe banana - 1

c) Constipation

It means hardening of stools, thereby resulting in difficult evacuation of the intestinal contents. This results in distention and infrequent or difficult evacuation of the faeces. The stools are sometimes accompanied by blood as the anal passage may be damaged.

Causes

- Inadequate diet
- Failure to establish regular times for eating, adequate rest and elimination.
- Faulty dietary habits, such as inadequate fluid and fibre intake or use of highly refined and concentrated foods that leave little residue in the colon.
- Chronic use of laxatives
- Difficult or painful defaecation due to haemorrhoids or fissures.
- Organic disorders such as diverticulosis

Formula fed infants have more chance of getting constipation than breast fed infants.

Types

1. Atonic constipation

It is the most common type of constipation. In this the intestinal walls lack muscular tone so that peristaltic action is impaired. The food thus cannot move at a normal rate down the tract. The chief causes of atonic constipation are selection of foods low in bulk, insufficient fluids, poor personal hygiene, lack of exercise, chronic illness and pregnancy.

2. Spastic constipation

This is characterized by increased tonacity of the musculature. The contractions throughout the tract act in a spasmodic manner, causing the movement of the food to be very irregular. Spastic constipation may be caused by irritation of the intestinal mucosa due to excessive use of alcohol, spices, tea, coffee or laxatives.

Symptoms

- Headache
- Coated tongue
- Foul breath and lack of appetite

Dietary management

This is based on increasing the intestinal bulk by increasing the fibre content of the diet.

- The intake of dietary fibre should be increased by eating whole cereals and increasing the consumption of fruits and vegetables.
- All refined cereals should be substituted with their wholesome counterparts.
- A fluid intake of 8-10 glasses a day is useful in keeping the intestinal contents in a semisolid state for easier passage along the tract.
- All foods containing fat such as butter, ghee, cream, oil etc must be included since fatty acids present in them stimulate the mucosal movements.
- Soups, whether clear or with cream, are nourishing and supply a good amount of electrolytes and water.

- Many laxatives are available. Their continued use may lead to excessive loss of sodium,potassium and water in the faeces and hence not recommended.

A model menu plan for Constipation

Early morning	Tea - 1 glass
Breakfast	Egg nog- 1 glass, Orange /lime - 1 medium, Brown bread - 2 slices with butter
Mid morning	Tender coconut water - 1 glass
Lunch	Chappathis - 2, Potato curry - 1 cup, Tomato soup with 5 g butter - 1 bowl , Green gram masiyal - ½ cup, Rice - ½ cup, Curd - 1 cup, Vegetable salad (lettuce, radish, carrot, beetroot, tomato and cucumber)
Afternoon	Orange/lime - 1 glass
Tea	Light tea - 1 cup, Keerai bonda - 1
Dinner	Cream of palak soup - 1 cup, Vegetable rice pulao - ½ cup, Channa curry - 1 cup, Chappathis - 2, cucumber raita - 1 cup
Bed time	Milk - 1 glass

III. Liver diseases

The liver is a complex and the largest gland associated with the digestive system in our body. It has several functions in our nutritional well-being.

The functions of liver have been summarized in Table 4.3.

Table 4.3 : Functions of Liver

Nutrient	Functions
Protein	Amino acid deamination, plasma protein and urea synthesis
Carbohydrate	Glycogen synthesis, storage and release, heparin synthesis.
Lipids	Bile, cholesterol, lipoprotein and phospholipid synthesis, fatty acid oxidation.
Minerals	Iron, copper and other mineral storage.
Vitamins	Vitamins A and D storage; conversion of carotene to vitamin A, role of vitamin K in prothrombin formation
Others	Drug, poison and waste product detoxification; alcohol metabolism; fluid and electrolyte balance.

Since liver is involved in so many nutrition related functions, it is understood that liver disease can have wide ranging nutritional consequences. Liver diseases can be caused by parasitic infections, alcohol consumption, poor nutrition, metabolic disorders and cardiac failure.

Causes of liver diseases and disorders

These comprise of the following

- Infectious agents – bacteria, viruses, parasites
- Toxins and toxic chemicals – phosphorus, chloroform, carbon tetrachloride.
- Alcoholism – excessive intake of alcohol over a long period of time.
- Metabolic or nutritional factors – impaired nutrition as in protein calorie malnutrition.
- Biliary obstruction – as in bile stone formation
- Carcinoma – hepatoma
- Decreased mass of functioning cells – due to damaged liver cells.
- Decreased blood supply

a) Jaundice

Clinical symptoms

Jaundice is the symptom common to many liver diseases. It is apparent from the yellow pigmentation of the skin and body tissues because bile pigments accumulate in the blood. It could be manifested in several forms.

Jaundice

Obstructive due to obstruction of bile by stones (Gallstones), tumours, or swelling of the mucosa of the ducts.	Haemolytic due to pernicious anaemia, yellow fever etc.	Toxic due to poisons, drugs or viral infections causing hepatitis.

Common symptoms in liver diseases

- Lassitude, weakness, fatigue
- Anorexia, weight loss, pain in the abdominal region
- Flatulence, nausea and vomiting
- Ascites, oedema

b) Hepatitis

"Hepatic" means something related to liver. Hepatitis is an infectious disease affecting the liver that may be viral or drug induced. Viral hepatitis may be of type A or B or C.

Type A or infectious hepatitis is transmitted either by faecal contamination of water or food or it may be transmitted parenterally. Type A hepatitis is usually mild and rarely progresses to chronic hepatitis.

Type B may be transmitted chiefly through improperly sterilized surgical needles. It is more severe and may potentially progress to a serious disorder.

Type C may be transmitted by blood transfusion. Drug or chemical induced hepatitis may be due to addiction to alcohol, heroin or due to sulpha compounds or penicillin or due to toxic substances like chloroform, carbontetra chloride.

Treatment

- Involves adequate rest, a nutritious high protein, high carbohydrate and moderate fat diet.
- Withdrawal of any external causative factors such as alcohol or the drug causing hepatitis to avoid any further damage to the liver.

Dietary Management

- A high protein, high carbohydrate, moderate fat diet divided into six to eight small meals which will encourage the patient to eat well and recover fast.
- About one gram of good quality protein per kilogram body weight is recommended. High protein beverages such as protinules and protinex in milk may be given in between meals.
- Most patients tolerate a normal fat intake, although a low fat diet is necessary when there is obstruction of the biliary tract.
- A liberal carbohydrate intake enhances the calorie level, ensures a continuous synthesis of glycogen and spares protein for repair of liver cells.
- Vitamin and mineral supplements are prescribed
- Some patients experience an intolerance to strongly flavoured vegetables, rich desserts, fried and fatty foods, nuts, chocolate and highly seasoned foods. Hence these may be avoided.

Foods to be included and excluded in hepatitis

Foods included	Foods excluded
Cereal porridge, soft chapathis, bread, rice, skimmed milk, tapioca; potato, yam, fruit, fruit juices, sugar, jaggery, honey, biscuits, soft custards and non-stimulant beverages.	Pulses, beans, meat, fish, chicken, egg, meat soups, sweet preparations where ghee, butter or oil are used, bakery products, dried fruits, nuts, spices, papads, chutney, alcoholic beverages, fried preparations, creams.

A model menu plan for Hepatitis

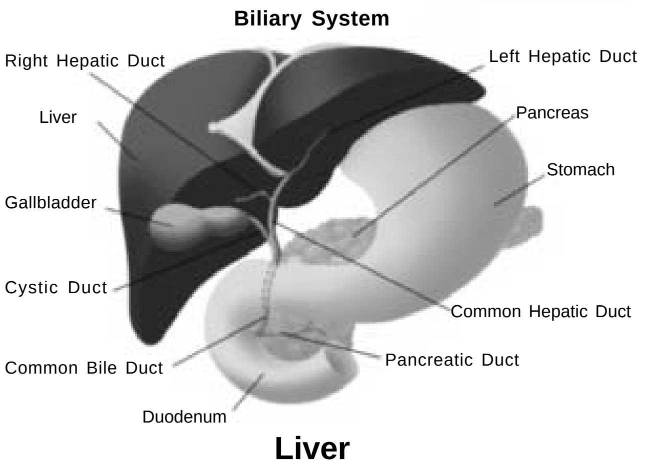
Early Morning	Tea - 1 glass
Breakfast	Milk with protinules - 1 glass, Bread with 5g butter - 2 slices, Poached egg - 1
Mid morning	Rice porridge / oats porridge - 1 cup
Lunch	Chappathis - 2, Medium thick dhal - 1 cup Palak curry - 1 cup, Potato curry - 1 cup, Rice - 1 cup, Curd - 1 cup, Roasted papad - 1
After noon	Banana - 1
Evening	Tea - 1 cup, Biscuits - 2
Dinner	Vegetable rava uppuma - 1 cup, Tomato chutney - ¼ cup, Rice - 1 cup, Curd - 1 cup
Bed time	Fruit salad - 1 cup

c) Cirrhosis of the liver

Cirrhosis of the liver may be due to infectious hepatitis, chronic alcoholism along with malnutrition. Destruction of the liver cells due to necrosis (destruction of cells), fatty infiltration and fibrosis may occur.

d) Hepatic coma

Complex syndrome characterized by neurologic disturbances which may develop as a complication of severe liver disease. It results from entrance of certain nitrogen containing substances such as ammonia into the cerebral circulation without being metabolised by the liver. It may be a consequence of stunting of the portal blood into the systemic circulation or of severe damage to liver cells in hepatitis.



Liver

4.2. Dietary Management - Obesity, Diabetes Mellitus and Blood Pressure

I. Obesity

Obesity is a state in which there is generalized accumulation of excess adipose tissue in the body leading to more than 20 per cent of the desirable body weight. Over weight is a condition where the body weight is 10-20 per cent greater than the mean standard weight for age, sex and height. Obesity invites disability, disease and premature death.

These may be defined as:

Overweight: A person who is 10-20 per cent above the normal ideal body weight for his age, sex and height.

Obese: A person who is more than 20 per cent above the normal ideal body weight for his age, sex and height.

Underweight: A person who is 10 per cent or more below the normal ideal body weight for his age, sex and height.

There are two types of obesity.

1.Developmental obesity

This category of obesity begins in the early years of a child's life and continues steadily over the adult years. Hence, the damage has already set in by the time the child is about four years old. The cells become saturated with fat and as the child grows older, more and more fat accumulates in the body. Muscle and bone mass also increase since the body has to carry the additional weight. Such children grow tall, look older for their age and are obese right through infancy even upto their adult years. This type of obesity results in a higher lean body mass along with fat.

2. Reactive obesity

This type develops due to periods of emotional stress in a child's life. During such stress periods the child may overeat resulting in increased weight.

Difference in sexes have shown that women generally gain weight after the first pregnancy and after menopause. Men gain weight generally after the age of 50 since their basal metabolic rate is lowered and the physical activities are decreased, while the food intake in terms of calories is not reduced.

Causes

Obesity is a complex multi factorial chronic disease developing from interactive influences of numerous factors genetic, social, behavioural, psychological and metabolic.

1.Genetic factors: Genetic inheritance probably influences 50-70 per cent a person's chance of becoming fat more than any other factor. Within families the chance is 80 percent if both the parents are obese and 50 per cent if one person is obese.

2.Age and Sex: It can occur at any age in either sex as long as the person is under positive energy balance.

3.Eating habits: Certain type of eating habits may lead to obesity.

- Nibbling between meals is common among housewives and is a potential cause for obesity.
- People who eat outside home more frequently are prone to obesity.
- People who eat more junk food (high fat and carbohydrate) may become obese.
- Certain cultural practices like making and distributing sweets on festive occasions contribute to increased calorie consumption.
- People who like to eat processed, concentrated and high fat foods are susceptible to obesity.
- Non-inclusion of fruits and vegetables and non-vegetarian diet favour weight gain.

4.Physical activity: Obesity is found in persons who lead sedentary lives and pay less importance to physical exercise. Though obesity can occur at any age, this is more common among middle age when physical activity decreases without corresponding decrease in food consumption.

5.Stress: Self gratification, self-punishment, depression, anxiety and stress may lead to excess calorie intake.

6.Endocrine factors: Obesity is found in hypothyroidism and hypogonodism. Obesity is common at puberty, pregnancy and menopause.

7.Trauma: Obesity may follow damage to hypo thalamus after head injury because it is not able to regulate appetite or satiety.

Regional Distribution of Adipose Tissue

Fat mass is distributed differently in men and women. The android or male pattern is characterized by fat distributed predominantly in the upper body above the waist, whereas gynecoid or female pattern shows fat predominantly in the lower abdomen, buttocks, hips and thighs. In abdominal obesity the waist to hip ratio is high.

Assessment

1.Body weight: An adult weighing 10 per cent more than the standard weight is overweight and 20 per cent more is obese.

2. Body mass Index

$$BMI = \frac{\text{Weight (kg)}}{\text{Height } (m^2)}$$

Grading of obesity can be done based on BMI

Grade III = > 40

Grade II = 30-40

Grade I = 25-29.9

Normal = < 25

3.Waist Circumference

It is the most practical tool a clinician can use to evaluate a patient's abdominal fat before and during weight loss treatment.

High risk waist circumference

Men >40 inches (>102cm)

Women >35 inches (>88cm).

4.Broka's Index

The formula for Broka's index is

Height (cm) – 100 = ideal weight (kg)

This measurement is easy to calculate and accurate.

Obesity

Principles of Diet

Low calorie, normal protein, vitamin and mineral, restricted carbohydrate and fat, liberal fluid and high fibre foods.

Dietary Management

Energy: About 20 k.cal per kg ideal body weight is prescribed for a sedentary worker and 25 k.cal. for moderately active worker.

Protein: About 0.8-1 g of protein/kg body weight is prescribed for tissue repair.

Carbohydrates: High carbohydrate containing foods like potatoes and rice are restricted and sugar which gives empty calories should be totally avoided. Fruits rich in carbohydrate like banana should be avoided.

Fat: Low fat or no fat diet should be given as calories are reduced. Foods rich in fat like nuts and oil seeds are avoided. Skim milk should be the choice.

Vitamins: With prolonged restriction of fats, there is likely to be a restriction of fat soluble vitamins A and D which may be supplemented.

Minerals: Restriction of sodium as common salt is helpful in weight reducing diet as excess sodium predisposes to retention of fluid.

Fluid: Fluids can be taken liberally as extra fluids are excreted by healthy kidneys. A glass of water before meals helps to cut down food intake.

Fibre: High fibre, low calorie foods like green leafy vegetables, fruits, vegetable salads, whole grain cereals and pulses can be included in the diet. Inclusion of high fibre foods in the diets for obese person has many advantages such as,

- Low in calorie density

- Foods like greens provide many vitamins and minerals
- Give satiety
- Help in regulating bowel movements
- Reduce blood cholesterol
- Promote chewing and decreases rate of ingestion

Dietary Guidelines

- The patient should be convinced that there is no other way of reducing weight except by consuming less calories than needed by the body.
- Body wraps and any kind of massage or both cannot bring weight reduction. No single food or drug can reduce weight.
- Maintaining weight is life long process. Hence after 40 years one should appreciate low calorie foods and reject heavy sweets.
- The diet should be adequate in all other nutrients except calories and high in fibre.
- Obese person should be encouraged to eat unprocessed foods or foods in their natural forms. They should limit fat, sucrose and alcohol.
- Exercise reduces body fat and increases muscle mass, brings down blood pressure, blood sugar, blood cholesterol, reduces stress and improves the feeling of wellbeing.

Suggested food preparations

Food preparation	Reasons
Vegetable salads	Low calorie, high fibre
Chappathis without oil	More proteins, high fibre and satiety value.
Thin dhals, steamed foods like idlis	Low calorie, high protein content
Thin soups	More fluids, low calorie and satiety value
Poached fish	Low calorie, high protein of good quality
Greens poriyal	High fibre
Coffee, tea without sugar	Low calories

FAD Diets

Most of the fad diets are commonly called crash diets. There are several of them such as rice diet, banana diet, liquid-protein diet, fasting diet or no carbohydrate diet. The main drawback which can prove hazardous in the long run is manipulation of the components of a normal balanced diet to an unbalanced one to achieve weight loss. Such diets which are potential health risks are not recommended.

A model menu Plan for an Obese patient

Tea	Tea without sugar - 1 glass
Breakfast	Skimmed milk without sugar- 1 glass (200ml), Bread toast with vegetable filling - 2, Orange - 1
Lunch	Tomato soup - 1 cup, Vegetable salad - 1 plate (Tomato, onion, cucumber, carrot, sprouted gram), Greens curry - 1 cup, Chappathis - 2 Rice - ½ cup, Thick dhal - 1 cup, Curd - 1 cup.
Evening	Tea without sugar - 1 glass
Dinner	Vegetable soup - 1 cup Snakegourd kootu - 1 cup Chapathi - 1, rice - ½ cup Curd - ½ cup

Foods to be Avoided, Limited and Consumed Liberally

S.No.	Foods to be avoided	Foods to be taken in limited amounts	Foods to be allowed liberally
1	Sugar, jaggery, sweets, candies, jams, jellies, chocolate	Cereals such as wheat, rice, jowar, bajra, ragi.	Raw and green vegetables.
2	Bakery products such as cakes, sweets, cream biscuits, pastries.	Dhals and pulses	
3	Concentrated milk and preparations like ice cream, basundi, cheese	Milk without cream	Thin buttermilk
4	Fatty meat cuts processed meat, ham, bacon. All organ meats such as liver, kidney, brain and shell-fish	Fish, lean meat, egg, root vegetables such as potato, sweet potato, yam, carrot and beetroot	Clear soups
5	Alcoholic beverages and all synthetic soft drinks		
6	Vanaspathi, ghee, cream, oil dressings,	Vegetable oils	

7	Fruits	One serving of the following; orange/ sweet lime/ guava / pear / papaya, banana, mango-one small size, Apple one small, Grapes - 20-25, papaya / pineapple / watermelon.	

II. Diabetes Mellitus

Diabetes mellitus is a chronic metabolic disorder that prevents the body to utilize glucose completely or partially. It is characterized by raised glucose concentration in the blood and alterations in carbohydrate, protein and fat metabolism.

The beta cells of the pancreas secrete insulin that regulates carbohydrate, fat and protein metabolism. The alpha cells of the pancreas produce glucagon that raises blood glucose levels. A balance between insulin and glucagon activity maintains blood glucose in a normal range. In diabetes mellitus there is either insufficient production of insulin or resistance to insulin by the body cells.

Causes of Diabetes

Lack of insulin may be either absolute or relative. The factors predisposing to diabeties are:

1.Acquired and environmental factors

a) Infection: It may be insulin dependent diabetes mellitus (IDDM) or non-insulin dependent diabetes mellitus (NIDDM)

b) Direct: Drugs which damage beta cells and develop diabetes.

c) Others: Through other mechanisms, such as toxic substances, inadequate protein intake, nitrosamines in foods such as those found in smoked and cured mutton, precipitate diabetes.

2. Changes in life style

a) Over-nutrition and obesity

b) Physical inactivity is an important risk factor in NIDDM

c) Malnutrition

d) Severe or prolonged stress

e) Drugs and hormones

f) Pancreatic disorders

3. Metabolic and Endocrine Disturbances

Hormones such as the adreno cortico tropic hormone (ACTH), glucagon and adrenalin are shown to be diabetogenic since they increase the level of blood sugar.

Prevalence of Diabetes Mellitus

Diabetes is on the increase in India. The multicentric ICMR study showed a prevalence of 2.5 per cent in the urban and 1.8 per cent in the rural population above the

age of 15 years. One in every eight individuals in India is a diabatic. The average age for the onset of diabetes is around 40 years while it is around 55 years in other countries.

Types (Classification)

Type I (IDDM): Insulin dependent diabetes mellitus is also known as juvenile onset diabetes. These diabetics depend on insulin. There is usually sudden onset and occur in the younger age group and there is an inability of pancreas to produce adequate amount of insulin. This may be caused by virus or due to auto immunity. The child is usually underweight.

Type II (NIDDM): Non-insulin dependent diabetes mellitus (adult onset diabetes), is non-insulin dependent form and develops slowly and is usually milder and more stable. Insulin may be produced by pancreas but action is impaired. This form occurs mainly in adults and the person is usually overweight.

Malnutrition Related Diabetes Mellitus (MRDM): This type of diabetes is mainly seen in some tropical countries like India and it occurs in young people between 15-30 years of age. The pancreas fails to produce adequate insulin. Generally people with MRDM are lean and undernourished.

Gestational Diabetes: Diabetes developed during pregnancy is described as gestational diabetes. It occurs in about one per cent of pregnant women. It also increases the diabetes related complications during pregnancy and also the subsequent development of diabetes after the delivery.

Table 4.4 shows the familial risk of developing diabetes.

Table 4.4: Familial Risk of Developing Diabetes

Familial Risk	Risk chance
If both parents are diabetics	99%
If one parent is a diabetic and the other from a family with a history of diabetes	70%
If only one parent is a diabetic	40%
If there is no history of diabetes in the family	20%

Table 4.5 shows the characteristics of insulin-dependent (IDDM) and non-insulin dependent diabetes mellitus.

Table 4.5: Characteristics of Insulin-Dependent (IDDM) and Non-Insulin Dependent Diabetes Mellitus (NIDDM)

Details	IDDM	NIDDM
Percentage of cases	10-20	80-90
Age of onset	Often under 20 years	Usually over 40 years
Symptoms	Classic	Often asymptomatic
Onset of symptoms	Sudden	Gradual
Insulin dependent	Yes	No
Oral hypoglycemic	No	Sometimes
Weight	Normal or underweight	Usually overweight
Genetic	Rarely	Frequently
Beta cell junction	Little or more	Erratic
Insulin receptors	Normal	Decreased or defective

Symptoms: Initial observations

- Increased thirst (polydypsia)
- Increased urination (polyuria)
- Increased hunger (Polyphagia)
- Weight loss (type I) or obesity (type II)

Biochemical symptoms

- Glycosuria (Sugar in the urine)
- Hyperglycemia (Raised glucose level in blood)
- Abnormal glucose tolerance

Other possible symptoms

- Blurred vision
- Skin irritation or infection
- Weakness, loss of strength
- Decreased healing capacity
- Fluid and electrolyte imbalance
- Acidosis (Ketosis, ketonuria)
- Coma

Blood Sugar Analysis

Diagnosis:

The following tests are used to detect diabetes mellitus

i. Glycosuria – Benedict's test

ii. OGTT (Oral Glucose Tolerance Test)

iii. Glycosylated haemoglobin

iv. Testing ketonuria

v. Random blood sugar analysis

Principles of Diet: Diabetes can be treated by diet alone, or diet and hypoglycemic drugs or diet plus insulin depending on the type and severity of the condition.

The main modes of treatment of diabetes are

- Diet
- Exercise
- Drugs
- Education

Objectives in the Management of Diabetes are to:

- Reduce the sugar in blood and urine.
- Maintain ideal body weight.
- Treat the symptoms
- Reduce serum lipids
- Provide adequate nutrition
- Avoid acute complications
- Prevent vascular complications

Diabetic diet need not be a complete deviation from the normal diet. Indian diets are generally high in carbohydrate and low in fat, with carbohydrates providing 60-65% of total calories and fat providing 15-20% of total calories. The rest of the calories 15-20% is derived from proteins. The nutrient content of a diabetic diet has to be planned based on the age, sex, weight, height, physical activity and physiological needs of the patient.

Diet for a Diabetic can be planned using the following:

1.Food exchange lists

2. Glycaemic index of foods

1. Food Exchange List

Food exchange lists are groups of measured foods of the same caloric value and similar protein, fat and carbohydrate and can be substituted one for another in a meal plan. The food exchange lists help the patient to restrict the food intake according to the insulin prescription so that hyperglycemia and hypoglycemia can be prevented and to have variety in the diet.

2. Glycaemic Index

The glycaemic index indicates the extent of rise in blood sugar in response to a food in comparison with the response to an equivalent amount of glucose. Factors that affect the glycaemic response to food are,

- Rate of ingestion of food
- Form of food
- Components of food – fat, fibre and protein content
- Methods of cooking and processing food

The glycaemic index is therefore useful in planning diet for diabetics. Cereals like wheat, rice, root vegetables like potato and carrot have a high glycaemic index (65-75%). Fruits have an intermediate glycaemic index (45-55%) and legumes have a low glycaemic index (30-40%) and are hence beneficial to diabetics.

Dietary Management

- Daily energy intake must be estimated after considering such factors as age, sex, actual weight in relation to desirable body weight, activity and occupation.
- The total intake of calories is more important for a diabetic than the exact proportions of protein, fat and carbohydrate in the diet. A diabetic should maintain standard body weight or slightly lower.
- Equal distribution of calories for each meal if no insulin is given. Breakfast and midmorning – 33%, lunch and tea – 33%, dinner and before going to bed – 33%.
- Simple sugars should be restricted since they are easily absorbed and have a high glycaemic index.
- A mixture of oils is preferred than single oil. Poly unsaturated fatty acids and monounsaturated fatty acids containing vegetable oils are preferred (sunflower oil, corn oil, groundnut oil, gingelly oil) than animal fat and hydrogenated fat which contain more saturated fatty acids. Fish and chicken are preferred than meat and egg.
- High protein intake helps to increase insulin production and promotes satiety. Pulses are rich in protein and fibre.
- Vitamins and minerals are supplemented if needed (especially fat soluble vitamins). Complex carbohydrates and fibre should be included in the diet. For each 1000 k.cal. consumption, 25-40g of dietary fibre can be included.
- The water soluble fibre has greatest hypoglycaemic and hypo-cholesterolemic effect. The diet should include legumes, whole grain and fenugreek seeds.
- Timely intake of snacks in between meal should be stressed to avoid hypoglycemia. Three main meals and three snacks between meal can be taken.
- Patients should avoid fasting and feasting
- Sodium intake is to be not more than 6g daily. Sodium is restricted to 3 g in hypertensive diabetic patients.
- Instead of simple sugars artificial sweetners may be suggested.
- Junk foods should be avoided.

High Fiber Foods

Foods to be avoided	Eaten in moderation	Foods permitted
Simple sugars (glucose), honey, syrup, sweets, dried fruits, cake, candy, fried foods, alcohol, nuts jaggery, sweetened juices.	Fats, cereals, pulses, meat, egg, nuts, roots, fruits, artificial sweetners	Green leafy vegetables, fruits except banana, lemon, clear soups, onion, mint, spices, salads, plain coffee or tea, skimmed butter milk.

Myths	Facts
Diabetics can eat wheat but not rice	Both have similar glycaemic index and raise the blood sugar to a similar extent. Wheat is more nutritious as it is rich in protein, fibre and B-vitamins
Any amount of wheat can be consumed	Large quantities of wheat increases blood sugar
Fasting can be compensated by the next meal	Fasting can lead to hypoglycemia. It is dangerous particularly who are on oral medicine or insulin.
Feasting can be done by fasting the next meal	This results in hyperglycemia
Diabetic diet is a special diet	This is a normal diet eaten regularly in moderation avoiding certain foods
Fruits can be eaten in unlimited quantities	Citrus fruits and apples can be eaten. Banana and mango are high in fructose, when eaten in unlimited quantities glucose may increase
Vegetables can be eaten in unlimited quantities	If eaten raw or with little fat or no coconut
Liquids are easily digestible	Preparations like kanjee are not preferred as they have high glycaemic index
Fruit juices / cola drinks can be taken	It is better to avoid empty calories like cola drinks. It is better to eat the fruit as such as glycaemic index and nutritive value is better.
Bitter foods like fenugreek and bitter gourd are good	Fenugreek seeds (not leaves) to be taken 25g / day to have an impact. This may not apply to all other bitter foods
Sugar is to be totally avoided	Artificial sweetners can be added in coffee and tea. Best is to appreciate bitterness in tea or coffee
Avoid carbohydrates and fats	Take complex carbohydrates and unsaturated fats.

A model menu plan for Diabetics

Early morning	Light tea without sugar - 1 glass
Breakfast	Cucumber sandwich - 2 (or) Oats porridge - 1 cup Tea without sugar - 1 cup
Mid morning	Butter milk - 1 glass
Lunch	Chapathi - 2, Dhal - 1 cup, Curd - 1 cup, Cauliflower and Cabbage curry - 1 cup, Tomato, Cucumber Salad - 1 cup
Tea	Tea without sugar -1 glass
Dinner	Wheat dosai - 2 , Tomato chutney - ½ cup Oats porridge - 1 cup
Bed time	Apple - 1, Skimmed milk - ½ cup

III. Hypertension

Hypertension, elevated blood pressure, is the most common circulatory problem in humans and it causes one in every 8 deaths world wide making the third leading killer in the world. Every individual has blood pressure which is necessary to move blood through arteries and to provide oxygen to the tissues of the body. It is a major risk factor for congestive heart failure, coronary heart disease, renal disease and stroke.

WHO defines hypertension as a condition in which systolic pressure exceeds 160mm Hg. and diastolic pressure exceeds 95mm Hg. High blood pressure is not a disease but only a symptom indicating that some underlying disease is progressing. Hypertension impairs the pumping function of the heart and if untreated damages the heart, brain and kidneys. A stroke occurs more often in patients with high blood pressure.

Causes

Cardiovascular diseases, glomerulonephritis, ploycystic renal disease, tumors of brain or adrenal glands, hyperthyroidism or diseases of ovaries and pituitary may cause hypertension.

Predisposing factors of hypertension are heredity, stress, obesity, smoking, high viscosity of blood due to too many red blood cells in the circulating blood, narrowing of the main blood vessels due to hormone secretions especially cortisone , aldosterone, adrenalin and noradrenaline.

Types

When the cause of hypertension is unknown, it is called as essential hypertension.

Mild hypertension: Diastolic pressure is 90-104 mm Hg. In this type treatment is based on weight loss, sodium restriction and behavioural changes.

Moderate hypertension: Diastolic pressure is 105-119 mm Hg. With moderate hypertension, nutritional therapy is supported by drugs.

Severe hypertension: Diastolic pressure is 120 to 130 mm Hg and above. Diet therapy revolves around potassium replacement and nutritional support for weight management and sodium modification.

Symptoms

- Many persons with hypertension have no symptoms
- Headache, dizziness, impaired vision
- Failing memory, shortness of breaths, pain over the heart
- Gastro intestinal disturbances
- Unexplained tiredness

Blood Pressure Measurement

Principles of Diet

Low calorie, low fat, low sodium diet with normal protein intake is prescribed.

Dietary Management

- An obese person must be reduced to normal body weight with low calorie diet. Alcohol consumption should be reduced.
- A diet of 60g protein is necessary to maintain proper nutrition
- It is advisable to avoid high intake of animal or hydrogenated fats. About 20g vegetable oil is permitted.
- Easily available carbohydrate is of great help in the management of high blood pressure.
- Restricted sodium and a decrease in the sodium/potassium ratio in the diet is preferred. When sodium is taken in excess, more water is drawn into the circulation, increasing the volume of blood to be pumped. Moderate sodium restriction 2-3g/day will reduce diastolic pressure.

- The role of potassium in hypertension is actually the result of a complex interplay with sodium, calcium and magnesium found in all living cells and in blood. Low levels of potassium cause the body to retain sodium and water and this can elevate blood pressure, lowest risk is among the high potassium, low sodium diet. Fruits and vegetables should be taken liberally to meet potassium requirements.

Sodium Restricted Diets

A normal diet contains about 3-6g of sodium. A normal diet is modified for its sodium content.

1.Extreme sodium restriction (200 to 300 mg): No salt is used in cooking. Low sodium foods are selected. This diet is used in cirrhosis of the liver and heart failure.

2.Severe sodium restriction (500 to 700 mg): No salt is used in cooking. Careful selection of foods is necessary. This level is used for severe congestive heart failure.

3.Moderate sodium restriction (1000 to 1500 mg): No salt is used in cooking. Low sodium foods are selected. Measured amount of salt is used. This level is suggested for those with a strong family history of hypertension and patients with borderline hypertension.

4. Mild sodium restriction (2000 to 3000 mg): Some salt is used in cooking but no salted foods are permitted. No salt is used at the table. This level is used as a maintenance diet in cardiac and renal failure.

Sodium in foods

Sodium content of animal foods is relatively high. Meat, fish, poultry, milk and cheese must be used in measured amounts.

Table 4.6 shows sodium content of foods.

Table 4.6: Sodium Content of Foods

S.No.	Foods with high sodium	Foods with moderate sodium	Foods with negligible amounts of sodium	Foods with insignificant amount of sodium
1	Salt	Milk, curd	Sugar	Fruits
2	Baking powder	Pulses	Oils	Cereals
3	Canned foods	Vegetables	Unsalted butter	Bitter gourd
4	Cheese (commercial)	Broad beans		Brinjal
5	Bacon, Ham sausages	Cauliflower, field beans		Cabbage
6	Meat, poultry	Knol khol		Peas

S.No.	Foods with high sodium	Foods with moderate sodium	Foods with negligible amounts of sodium	Foods with insignificant amount of sodium
7	Fish, shell fish	Green tomato		Pumpkin
8	Salted chips, pappads	Beetroot		
9	Pickles	Radish, carrot		
10	Sauces, soups	Amaranth		
11	Dried fruits	Spinach		

Foods to be avoided in Hypertension

- Salt in cooking or at the table
- Monosodium glutamate (Ajinomoto)
- Baking powder, sodium bicarbonate and sodium benzoate
- Salt preserved foods – pickles, canned foods
- Highly salted foods such as potato chips
- Spices and condiments such as ketchup and sauces
- Cheese, peanut butter, salted butter
- Frozen peas
- Shell fish and dry fish
- Prepared mixes, biscuits, cakes, bread, pastries.

A Model Menu Plan for Hypertensives: (No salt is used in the preparations)

Early morning	Mild tea - 1 glass
Breakfast	Idli - 2, Coriander chutney - ½ cup
Midmorning	Vegetable soup - 1 cup
Lunch	Chappathi - 3 or Rice - 1½ cups, Mashed potatoes, green gram dhal - ½ cup, Curd - ½ cup
Tea	Tea or fruit juice - 1 glass Nuts - Fried without salt - few
Dinner	Vegetable uppuma - 1 cup, Sambar - ¼ cup
Bed time	Milk - 1 glass

4.3. Role of Dietitian, Counseling Methods

Dietary Counseling

Dietary counseling means instructing patients about therapeutic diets. The major objective of dietary counseling should be to educate the patients regarding the nature of the disease, its hazards, and how it can be recognized and prevented, advice on personal hygiene, individual instructions on diet and any specific therapy are essential. For effective dietary counseling, a team approach (physician-dietitian-nurse-patient) should be encouraged for success in diet therapy. A good rapport should be established with the patient. He should be made aware of the fact that diet plays an important role in the prognosis of the disease and that he should strictly follow the guidelines of diet therapy; also he should be encouraged for a regular follow up programme in order to remain in normal health.

Apart from food service, the diet clinic for an outpatient helps in wider use of dietary counseling and serves to extend and clarify diet instruction and have follow-ups. Whenever possible home visits may also help in ensuring the adjustment of the patient to the home environment. In a food clinic or health centre, group therapy may also be used with advantage for such groups as pregnant and lactating women, women with preschool children, diabetic patients, and so on.

Dietitian

One who plans and supervises the preparation of therapeutic or other diets for individuals or groups in hospitals, institutions, other establishments and for workers in particular sectors, gives instruction in selection and proper preparation of food according to dietetic principles, performs duties related to nutrition programmes and may be responsible for food purchasing on behalf of an organization or establishment.

Public Health Nutritionist

One who appraises various factors related to nutrition and food problems in the community, plans and executes nutrition elements of health programmes, participates in programmes of nutrition activities for particular groups or the community.

Role of a Dietitian

A clinical registered dietitian may work in a hospital, medical office or health agency whereas the administrative registered dietitian manages work in the food service or in the dietary department.

A registered dietitian has certain responsibilities which are listed as follows:

- To assess the nutritional status of patients in health and disease.
- To devise and coordinate all aspects of nutrition care, long-term and short-term plans, and nutrition education plan should be included.
- To document all aspects of nutrition care.
- To arrange patient followup as needed.
- To participate in applied research as well as diet related professional activities.

- To apply research findings and current knowledge in nutritional care of patients.
- To communicate effectively and share knowledge with other members of the health team.
- To plan diets as per the doctor's diet prescription
- To prepare the patient mentally to accept the modified diet
- To plan and make the diet more appetizing and appealing and
- To enlighten and motivate the patient as per the needs regarding the technical and scientific aspects governing the diet.

The Indian Dietetic Association - Activities

The Indian Dietetic Association (IDA) was founded with Dr.C.Gopalan as president and Dr. Kalyan Bagchi as secretary in 1963 with a band of nutritionists, dietitians and medical scientists who were resolved to deal with problems concerning nutrition and to highlight the importance of dietetics and nutrition in the maintenance of health and also in the prevention and treatment of disease.

Aims and Objectives of the Association

- To encourage nutrition education
- To promote teaching, research and training in the filed of dietetics and nutrition
- To safeguard the interests and welfare of dietitians
- To publish a scientific journal titled "Applied Nutrition"
- To conduct Registration Examination to prepare dietitians to start their own private practice
- To promote interaction with dietetic associations at internatinal level.

Activities of the Association

- To organize seminars and lectures in which eminent scientists from India and abroad participate.
- To organize annual conventions which are a forum for the dissemination of knowledge.

Questions

PART - A

I.A) Choose the Correct Answer

1. Fever is an elevation of body temperature above ____________
   a) 84.4^{0}F b) 98.4^{0}F c) 92.4^{0}F
2. ____________ is an acute fever
   a) Typhoid b) Tuberculosis c) Malaria
3. Persons with blood group 'O' are affected by ____________
   a) Fever b) Diarrhoea c) Ulcer
4. Bland diet is suggested for ____________ patients.
   a) Constipation b) Diabetes c) Ulcer
5. Oral Rehydration Therapy is the preventive measure for ____________
   a) Diarrhoea b) Ulcer c) Constipation
6. ____________ is the symptom for liver diseases
   a) Jaundice b) Diabetes c) Obesity
7. Type C viral hepatitis is caused by ____________
   a) Blood transfusion b) Surgical needles c) Faecal contamination
8. Severe liver disease leads to ____________
   a) Cirrhosis b) Hepatitis C c) Hepatic coma
9. An individual with 20% above the normal weight is called as ____________
   a) Obese b) Diabetic c) Hypertensive
10. Male pattern obesity is characterised by ____________
    a) Gynecoid b) Android c) Fat mass
11. Fad diets are followed during ____________ conditions
    a) Jaundice b) Diarrhoea c) Obesity
12. Increased thirst during diabetes is called
    a) Polydypsia b) Polyuria c) Polyphagia
13. Raised glucose level in blood is called ____________
    a) Hyperglycemia b) Hypoglycemia c) Glycosuria
14. Benedicts test is used to detect ____________ condition
    a) Diabetes b) Jaundice c) Hepatic coma
15. Severe sodium restriction permits ____________ of sodium
    a) 200 - 300 mg b) 500 - 700 mg c) 1000 - 1500 mg

B) Answer in one or two sentences

1. Define fever.
2. Write the endogenous factors causing fever.
3. Name the bacteria that causes typhoid.
4. Write the causative bacteria for ulcer.
5. What is dumping syndrome?
6. What are the two types of diarrhoea?
7. Mention the two types of constipation.
8. List the different forms of jaundice.
9. How will you calculate BMI?
10. What is Broka's Index?
11. Give the meaning of polydypsia.
12. State the meaning of polyphagia.
13. What is glycosemia?
14. Expand OGTT.
15. Write any two foods to be permitted during diabetes.
16. Write any two foods to be restricted during diabetes.
17. What is hypertension?
18. Write the normal sodium intake.
19. Expand IDA.
20. Write the meaning of "hepatic".

PART - B

II. Answer in five lines

1. Draw the figure showing the development of fever.
2. Classify the types of fever.
3. List the signs and symptoms of typhoid fever.
4. Mention the signs and symptoms of tuberculosis.
5. Give any 4 causes for ulcer.
6. What is a bland diet?
7. Write the formula of ORS.
8. What are the causes of constipation?
9. Give the common symptoms in liver diseases.
10. Define cirrhosis.
11. Write the grading of obesity based on BMI.

12. Classify diabetes mellitus.
13. What is food exchange list?
14. What are the symptoms of hypertension?
15. List the fodos to be avoided in hypertension.

PART - C

III. Answer should not exceed one page

1. Explain the general dietary considerations during fever.
2. Write the dietary management for typhoid.
3. What is tuberculosis? Give a model menu for a tuberculosis patient.
4. Elaborate the principles of diet and dietary management of ulcer.
5. What is diarrhoea? Explain the types, symptoms and dietary management?
6. How do you manage a patient having constipation?
7. Define constipation and write a model menu for constipation.
8. Explain the different functions of liver.
9. Discuss the causes of obesity.
10. How do you assess obesity?
11. Write the symptoms of diabetes mellitus.
12. List the foods to be avoided during hypertension and give a model menu.
13. Discuss the role of a dietitian.
14. Write on IDA.
15. Explain sodium restricted diets.

PART - D

IV. Answer in Detail

1. Explain the symptoms and dietary management of tuberculosis and give a model menu.
2. Discuss ulcer under the following headings:
   a) Causes b) Symptoms c) Treatment d) Dietary management
3. What is hepatitis? Explain the dietary management and foods to be included and excluded. Give a model menu.
4. Discuss the causes of obesity and different techniques in assessing obesity.
5. Write in detail about the dietary management of diabetes mellitus.
6. Discuss the myths and facts about dietary management in diabetes.

5. FOOD SERVICE INSTITUTIONS

5:1 Catering Institutions: Objectives and Types

Catering Institutions form the backbone of the tourist, trade and are important foreign exchange earners. Institutional feeding is not new to India. Religion, tradition and culture have always brought people together in large numbers to celebrate festivals, participate in mass prayers and enjoy special occasions such as marriage, birthday celebrations all of which involve eating together. The development of catering institutions has however closely followed the changes in eating habits and need of people that have resulted from the development of the country in different spheres such as education and international trade. As the country advanced in the economic spheres, social and psychological factors became important in the further development of catering institutions. Eating out began to be considered prestigious, fashionable and a means of entertainment.

Industrialisation brought with it a spurt of employment opportunities for men and women. This created a relative shortage of domestic help and working women could no longer entertain at home easily. The only draw back is that the industry is characterized by a number of different types of catering establishments which had mushroomed in response to the needs felt by individuals, families or groups. These have increased but not developed in a systematic manner. The types of catering facilities are varied and the numbers are increasing everyday hence the need to focus on relatively small scale establishments in terms of providing planned operations in great establishments feeding from 50-200 people per day need to be looked into in order to ensure a fair deal to the customer in terms of health, sanitation and enjoyment of food.

Meaning and definition of catering

Catering is an art of providing food and drink aesthetically and scientifically to a large number of people in a satisfactory and cost effective manner. Since a catering institute involves diverse activities and variety of products and services, it provides a special challenge to the manager.

Catering is a process of meal planning, food selection, preparation and service, coherent thinking, clear cut organisation, successful personnel directions including delegation and supervision, sanitation, an adequate system of cost control and wise planning of physical lay out with the selection of proper lay out of equipment. So that food can be cooked and served well to the customer. Food service is not merely to supply food, but rather to supply the best possible food, more palatable, well prepared under acceptable standards of sanitation and pleasingly served at the allotted cost.

Catering institution deals with the service of food from the kitchen and there are several methods which are employed to enable the customer to receive the meal. The mode of service depends on the type of establishment and the cost of operating these methods varies but the final objective is the same ie., when the food is presented to the customer, it should look attractive, right in temperature and worthwhile.

- Customer tastes varies on different days and even at different times on the same day. These results in radical changes in the amount of food unsold and therefore wasted.
- Food is more vulnerable to pilferage, theft, contamination, spoilage and wastage. Therefore it needs to be strictly controlled at all stages of production and services.
- A large variety of costs are incurred in different ways by caterer of different types of services.
- There is a marked prevalence of seasonal trading
- Fixed costs continue to be incurred whether the facilities are used or not.

In view of the above special features, catering institutions and management requires a professional approach backed by special skills, knowledge and vigilance at every stage of production and service.

Some principles which form the basic guidelines for catering operations

a) Division of work

b) Authority and responsibility

c) Discipline

d) Unitary command

e) Unitary direction

f) Individual goals subordinate to establishment goals

g) Payment of remuneration

h) Hierarchy

i) Orderliness

j) Loyalty and devotion

k) Work stability

l) Initiation

m) Unity

n) Control

Types of catering Institutions

Catering institutions can be classified into two types based on the objectives as follows:

1. Commercial catering
2. Non-commercial catering on welfare or subsidized catering

1. Commercial catering

Consumer satisfaction and profit are the main goals of commercial sectors. The customer is the king. Therefore, he can accept or reject the service being provided (eg) Hotels, restaurants, clubs, bars etc.

The provision of food for people of all ages in all walks of life, at all times of the day or night and in varied situations shows the variety of scope which is to be found in the catering industry. This contributes to the national economy and therefore all aspects of the catering Industry have an important role to play in the health of the nation.

Categorisation can be broadly based on food standards and levels of service. More than one style can exist within the same restaurant and particularly within the same hotel. From these criteria, the nature of the establishment is normally determined.

a) Hotels: Hotels are residential and most of them will provide breakfast, lunch, tea, dinner and snacks.

b) Restaurants: Smaller unit of a hotel where no lodging is provided. Restaurant will vary with the kind of meals they serve. Some will serve all types of meals, while others will just serve lunch and dinner or lunch with tea. Banquetting is an important part in restaurant service.

c) Coffee shop: This has simple style menu, often with a sit up counter provision. It will provide a simple menu or snacks throughout the day.

d) Speciality restaurants: Now-a-days customers wish to enjoy something with more individuality than the ordinary menu and speciality restaurants of many different types are to be found as part of a hotel's food services. Characterised by specific style, they may even be national in menu service. These emerged primarily as a means of reducing the problems associated with the general menu operation.

e) National restaurants: Today it is possible to eat food based upon the specialities of almost any country. National restaurants can be Italian, French, Chinese, Greek or others. These restaurants are based on interior decoration, special display and national costume of the waiter.

f) Clubs: Clubs as a sector of the hotels and catering industries are established for offering foods and drinks. These are usually administered by a secretary or manager appointed by a management committee formed by club members. Good food and drink with an informal service in an old English style are required in most clubs.

g) Transport catering: All sections of society have become mobile in a way experienced never before and this has led to a most explosive demand for catering facilities wherever people are on the move.

i. Train catering: The train facilities to be provided depend upon train timings, departure and arrival, length of the journey and the types of people travelling. It may run on breakfast, lunch, tea, dinner or light refreshments. Menu types that are listed are those popular with majority of the passengers.

ii. Restaurant car service: A restaurant on wheels is one wherein a waiter service is available with an appropriate seating accommodation. Passengers move to the car for services and then return to their seats on the train.

Full meal service is one where passengers are served in their reesrved seats for which they pay supplementary fee.

iii. Airways catering: It originally consisted of packets of sandwiches and flasks of tea, coffee and alcoholic beverages. Several overseas airlines make a special feature of their national character.

Because of safety factors and restrictions imposed by space and weight only limited cooking is permitted or food is prepared on the ground and put into the aircraft. Basically, four types of food are served cold meals, fresh hot meals, deep frozen meals and chilled meals.

iv. Marine catering: A vessel is built to cater for the specific run, type of passengers and weather conditions of the part of the world or waters on which it will sail. These factors will have direct bearing upon the space required for passengers, crew accommodation, cargo, fuel engine and stores as well as types of ventilation, heating and lighting needed. The quality of food, type of service and facilities offered depend on the class of the ship and the price the passengers are willing to pay.

v. Motor way catering and motels: It started with hamburger and developed through chicken, fish pieces, pizza and chip operation. It is designed to serve simple food usually one item and serve immediately either on or off the premises - e.g. Hamburger units, fish chip shops and concentrated beverage syrup shop.

vi. Pubs: The idea of pubs is fairly new in India. It has been borrowed from the concept of public house in England and adapted to Indian conditions. They are geared to provide service of all types of alcohol with emphasis on beer and music. Food may also be served from a limited area.

vii. Wine bars, fast foods and take aways

Customer demand has resulted in the rapid growth of a variety of establishments offering limited choice of popular foods at a reasonable price with little or no waiting time, to be consumed either in the premise or take away. This section of industry is concerned with the preparation and service of food and beverage quickly for immediate phase to the customer for consumption either to the premise or the section of the industry.

a) The units are usually seen around the products, a range of product (fish) as products of a country.
b) The units are often connected by large chain as they are franchised
c) The product is very well marketed. It is advertised on television, local radio and newspapers to the customers and offer take away items.
d) The pricing of the items is fairly within the distinctive known price.
e) The commodities used are often of the convenience type (eg): concentrated beverage syrup.
f) The method of food production is often partially or fully mechanised. The method of food service is simplified and basic.

Restaurant

2. Non-commercial catering or Welfare or Subsidised Catering

The social objectives in these catering can be as important as the nutritional ones.

a) College catering: College students should be provided good food which is balanced, palatable and at controlled cost. There should be sufficient varieties and social participation too.

b) Hospital catering: It is recognised that the provision of an adequate diet is just as much a part of the patient's treatment as careful nursing and skilled medical attention. The main objective is to assist the nursing staff to get the patient well as early as possible. To do this, it is necessary to provide good quality food, which has been carefully prepared and cooked to retain maximum nutritional value and presetned to the patient in an appetising manner. The greatest need is to provide a sense of security to patients.

c) Industrial catering: Many industries have realised that output is related to the welfare of the employees. It is not only a place to eat and drink but also a social centre which reflects the nature of the company. Nutritional benefits to reduce sickness are essential thereby to increase the efficiency of the workers and effectiveness of production. Well fed workers produce more and better work.

A great deal of money is spent in providing first class kitchens and dining room and in subsidizing the meals. Need for a relaxing non work atmosphere is regarded as a highly desirable aim.

d) Voluntary organizations: These organisations will be different depending on the standards and need of the groups, aims and objectives (eg) oldage homes, orphanage etc. It is essential that in these establishments, the nutritional balance of food is considered as in all probability the people eating here will have no other food.

5.2. Tools of Management - Organizational Chart, Job Description, Job Specification, Work Schedule

The term "Tools of Management" refers to materials which have been developed by managers in the past and used as an aid to effective management. These vary with the level of management and therefore each level uses different aids. The basic tool for any establishment is the organisation chart which shows the structure of an organisation in terms of how the various units or departments are linked together.

Organisation Chart: The organisation structure is the outcome of putting people and jobs together and therefore represents the entire team involved in the running of the establishment at both operational and management levels.

Factors for preparation of organisation charts

An organisation chart shows the subordinate superior relationship and the lines of decision making authority that exist in an establishment in other words "who" reports to "whom". It also establishes the existence of unitary or dual command as the case may be, helping to correct any incosistencies that may show up on the chart.

Any organisation that has a detailed organisation chart can be associated with a well set structure, having functions logically arranged to achieve maximum efficiency. These formal arrangements are based on formal leadership and methods of communication with the hope of achieving proper co-ordination, because people tend to accept their positions in the organisation as charted out

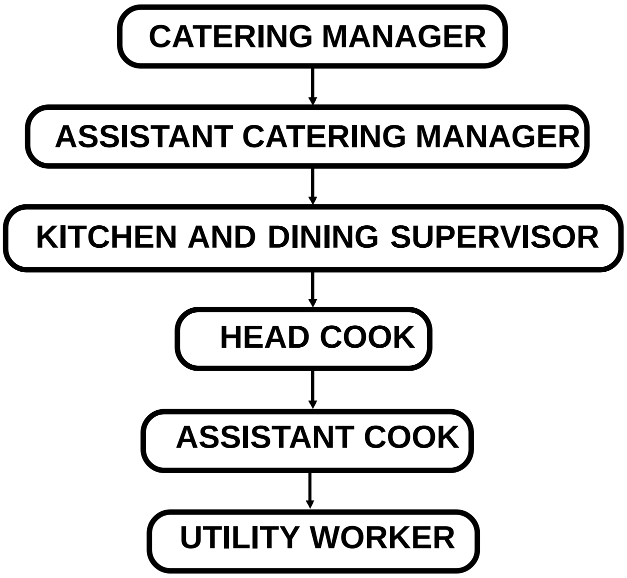
The two types of authority relationship that most often exists in food services are line and line and staff relationships. In the former each individual is responsible to the person ranking above him on the organisation chart. Thus authority and responsibility are passed downward. In the later that is line and staff pattern, specialists are positioned at various levels to advise those along the line structure because the activities of the establishments become too diversified for proper functioning and control. The expertise of staff is utilised to maximise the efficiency of line personnel to the utmost.

However, a number of problems can arise if the information channels in an establishment strictly follows the lines of authority. In catering particularly, where staff are expected to fill in for others at short notice, specialist departments can prove futile if informal channels of communication do not develop.

Organisation structure can grow in two directions - vertically and horizontally. In vertical structured organisation the person above assigns the work to his immediate subordinates down the line.

Figure 5.1 exhibits the vertical structured organisation.

Figure 5.1: Vertically Structured Food Service Establishment or Organization



As the length of the structure increases, coordinating the activities of the establishment become difficult, so the duties get divided separately for each unit. This results in a horizontally spread structure. An organisation chart thus indicates functional unit as well.

Organisation structures may also indicate whether authority is centralised or decentralised which means all decisions must come from the highest level. While an organisation chart can be used as a tool for managing, the chart has its own merits and demerits.

Merits:

1. It provides the number of people working in the institution with their names and designation, clearly at once.
2. It shows the relation between each other and also the institution
3. Management can exclude and include the necessary persons and activities by looking at the chart.
4. It is also easy for a person to distribute any activity by considering its importance.
5. A person can compare and contrast the activities of each individual with the previous chart. For example the management will come to know about the promotions and inclusions of new persons to the institution.
6. It is easy to know about the activity concerned to the institution and also to the specific department of an individual. For example, the store keeper - the organisation chart explains about the activity of the store keeper to the storage departments and also to the entire department.

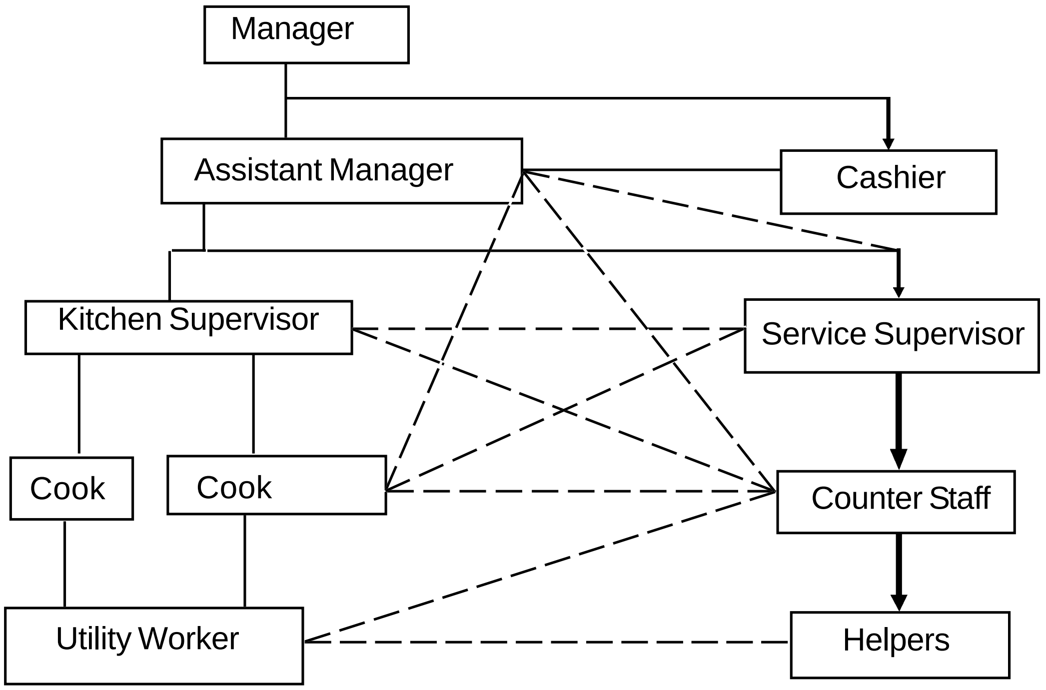
Demerits:

1. An organisation chart does not show the nature of the activity or the responsibility.
2. The chart is of no importance if they are not upto date with individuals' name and their accurate positions.

An organisation chart is considered to be an important tool and an organisation cannot improve on the basis of its function without an organisation chart. It is considered to be wise to layout the organisation chart with vivid positions and then distribute the activities according to the individual's talent, capacity and their education.

A model chart for a catering establishment (snacks bar) is indicated in Figure 5.2.

Figure 5.2: Organization Chart of Snack Bar



It will be noticed that the number of personnel at operative levels increase according to the size of the establishment. The formal relationship do not exist between the service staff and kitchen personnel, informal relationships get established if pleasant relations are harboured by managers who can then use these channels to advantage for greater efficiency.

Within the structures of different organisations illustrated, other tools required by a food service manager for efficient management are job description, job specification, work and time schedule, job analysis, production and service analysis statements and budgets as indicated in the following figure according to the various levels in an establishment. These tools are discussed in detail in Table 5.1.

Table 5.1: Main Tools of Management

<table>
<tr><th>Organisation Level</th><th>Tools used</th><th>Responsibility</th></tr>
<tr><td>Kitchen production and service</td><td>Job description, job specification, time and work schedules, staff duty lists / rotary menus</td><td>Responsible for actually producing and serving food</td></tr>
<tr><td>Line Management</td><td>Job analysis data sheet, production plans, sales analysis records, cyclic menus, leadership style</td><td rowspan="2">Over all supervision of kitchen and service points placing requisition for ingredients and issue from stores directing, co-ordinating, controlling, preparing, staff duty lists, staff requirements, ordering food materials, planning profitable menus, arranging for parties and preparing budgets (operating)</td></tr>
<tr><td>Middle Management</td><td>Plan for staffing, menus, absenteeism records, price lists, inventory records, order sheets, standard costing sheets, budget statement.</td></tr>
<tr><td>Top Management</td><td>Plans for sales, purchases, recruitment, expansion, decision making, communication, leadership</td><td>Setting goals, policy making for man power planning, introducing technology, planning for profits, diversification</td></tr>
</table>

Job description: Job description refers to the definition of a job in a precise manner indicating exactly what is to be done by people, who are occupying or would be occupying a job position in an establishment. A well defined job brings about greater certanity of what is expected in terms of the performance and when actual results match expected ones both morale and efficiency are raised. However a job should not be too narrowly defined and too vague description also makes it difficult to understand and handle the job, leading to frustration and loss of control.

Job description is therefore effective in managing at every level of the organisation structure. Job descriptions need to be more detailed, clear cut and expressed in a language and form which can be understood by less educated workers. At higher levels, people have a better knowledge of the work for which they are appointed and are expected to have a higher mental calibre. Besides, the results of their work are not immediately seen as in the case of operative staff. Since the proportion of mental work increases, they have greater flexibility in timing their work and can adjust their schedules so long as they go on feeding the information required by operating staff at the right time.

Job description also acts as check lists for staff who may forget to do a job till it becomes routine for them. The job description of the catering manager is more general, expecting him to work to an efficiency guided by his experience.

Job Description of a Head Chief

Title: Head Chef

Code Number :

Establishment :

Job Summary : The job involves

- Planning menus with catering supervisor
- Requisitioning ingredients for food preparation
- Checking quality of food received and getting it issued for use or storage in kitchen as required
- Allotting work to assistant cook
- Guiding them in the preparation and processing techniques
- Preparing main dishes
- Finishing all food
- Testing for acceptability
- Getting next day's menus checked
- Getting preparations done and refrigerated for use next morning
- Getting kitchen cleared up at the end of each day
- Locking up or handing over work to the person taking over for the next shift as the case may be

It can therefore be generalised that job descriptions are not only important aids to job performance at all levels of an organisation but they help to draw up recruitment requirements, to set up salary levels to provide the guidelines for training and aid in controlling activities within the establishment. Job description also remove conflicts between people in terms of specifying each persons job responsibilities.

Job Specification: A job specification is a statement indicating standards to be achieved for a particular job. It also covers duties expected to be performed, working conditions in which the job would be carried out and the qualification required. A job specification is generally used as a tool for selection of the right employee for a particular job. Small establishments may use the job description instead of the job specification for the purpose, because closer supervision is possible at work to check if expected standards of performance are achieved at every stage of production or service. A sample job specification is given below in Table 5.2.

Table 5.2: Sample Job Specification

Job title	:	Cook
Department	:	Kitchen
Supervisor	:	Catering Manager
Job summary	:	As under job description
Education	:	Craft course in catering
Experience required	:	At least two years experience in an
	:	institutional kitchen
Knowledge and skills	:	Knowledge of Indian and Continental cooking
Personal standards	:	Clean appearance and habits
References required	:	One at work and one more person
Hours of work	:	40 hours a week
Promotional opportunities	:	To head cook and with extra qualification to kitchen supervisor
Ability tests		Actual performance tests to be passed to expected standards

Work Schedule: This represent an outline of the work to be done by an employee. When this is to be completed within a time schedule it is referred to as a time and activity plan.

For proper scheduling it is important to analyse tasks which are to be performed on a particular day. In catering, the production day can be divided into low and high production periods and an understanding of these are important in scheduling tasks. As a rule, tasks requiring minimum effort, time and attention should be scheduled or planned for performance during periods of low production as these follow high pressure work periods of peak hour production and service. Besides, providing the necessary relaxation such scheduling gives a sense of achievement and motivates staff to cope with the pressures of peak hours. If complicated tasks are fixed for a low production period they appear to get more complicated. The best time to schedule such tasks is in the morning when workers are fresh and rested. People who have worked for more than eight hours a day should be given simple jobs, which do not require a lot of care and attention, otherwise mental and physical fatigue sets in.

A job considered disagreeable by a worker should only be scheduled during peak hours when it gets done in the stride because people do not have the time to think of it in particular. If all jobs are considered in the light of their physical, psychological, social and environment effects on performers, work has a number of advantages.

a) More work can be done in a day, imparting a sense of achievement

b) Resources are better utilised, making work more productive

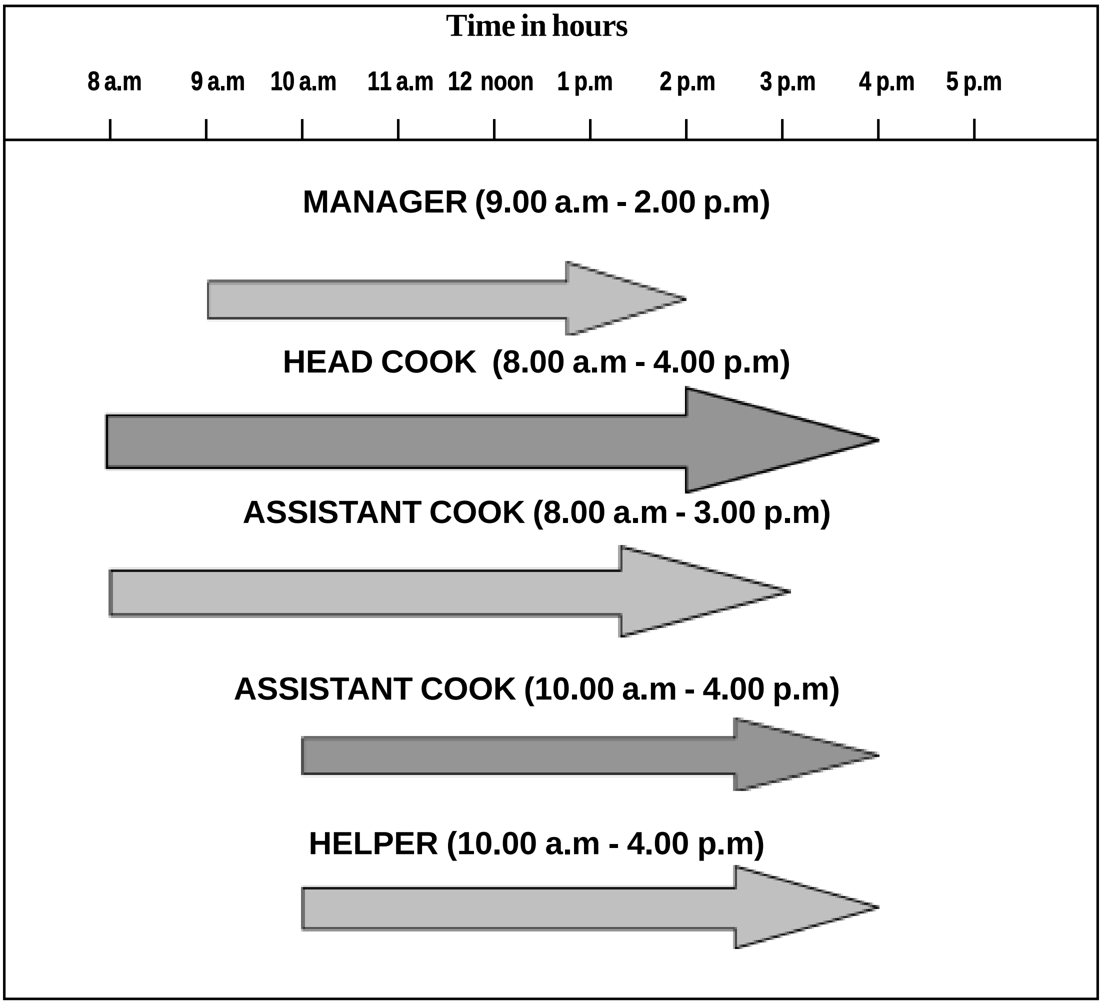
c) A busy schedule leaves very little idle time, gives greater satisfaction and raises staff morale

d) The involvement is greater and staff perform their best

Apart from work and time scheduling productive work depends a lot on people's attitudes to their work, the nature of the job, the time and concentration required to perform it and the amount of satisfaction derived from it. Analysing tasks and scheduling work can therefore help to identify materials, equipment, time and skills required for doing particular jobs. It is an effective tool for efficient working as it helps to establish a sequence in which jobs are to be done within a time frame. This sequence is readily available before the work is started, hence, it helps each worker to know what he has to do without waiting for verbal instructions and wasting time.

A sample work schedule for a self service canteem operating between 10am and 5pm. Offering a choice of plated lunches, snacks, sweets and beverages is given in Figure 5.3. The peak hours of production and service is 10.00 am and 2.00pm. All the staff are present. The timing for staff are therefore staggered before and after the peak hours. Work and time schedules not only chalk out the work plan for staff but a glance of it will help to identify tasks which may be combined, eliminated or modified for greater efficiency.

Figure 5.3: Sample of Time Schedule for Staff



For effective scheduling a catering manager must have data on the time required for performing a particular job. Schedules are important tools for demarcating the responsibilities of each worker and giving them a sense of achievement at the end of task. A schedule may also indicate changes or additions to normal duties on a particular day and helps to check any claims for overtime work performed. Flexibility should always be built into schedules to enable food services to adjust their work in response to technological and other environmental changes. The food industry is unique in the sense that there is a constant need to increase or decrease staff strength at the production and service levels, depending on the number of customers and their requirements.

Work and staff need to be scheduled properly for two main reasons

- **To have the right type of skill available when required:** For instance there is a need to have more service staff available at lunch time in food service establishment, rather than kitchen staff. Once the food is ready only one or two back-up staff in the kitchen are necessary for ensuring a constant flow of food from kitchen to service counter. The number will of course depend on the type of the service and the customers.
- **For maximum efficiency:** The production and service areas should not be overcrowded or else the work environment will not only cause fatigue but also become prone to accidents.

Successful scheduling in terms of man hours and skills can only be done if jobs are analysed properly along with working conditions, menu patterns, purchasing methods, quantities handled and equipment required.

5.3. Equipment Needed for Catering Institution

Equipment

The term ‘equipment” refers to all machinery, tools, utensils, crockery, cutlery and furniture which may be used for preparation, service and storage of food. The types of equipment required vary with the activities carried out in a particular area of work. Catering equipment ranges from simple boiling pans or pots, sauce pans and iron grids to sophisticated cooking ranges, skillets, steamers, ovens, grills and temperature controlled fryers. The list can be endless depending on the cooking and eating habits of people in any region and the cooking and the type of food service.

Classification

Equipment may be classified according to weight or size, the order in which it is used in the production cycle of a catering establishment or according to their mode of operation.

Equipment

Weight or size	Order of use	Mode of operation
a) Heavy duty	a) Receiving	a) Fully Hand - operated
b) Medium duty	b) Storage	b) Semi - automatic
c) Light duty	c) Kitchen	c) Fully - automatic

1. Weight or size:

a) Heavy duty: This category includes all equipment that are generally too heavy to move around, and are therefore meant to be fitted or installed after careful planning. These are made of heavy metal sheeting that can withstand hard use for long periods of time. Heavy or large equipment such as ranges, ovens, mixing machines are generally manufactured in standard sizes.

b) Medium duty: This equipment refers to pieces which are not too difficult to move for occasional cleaning. They may be so constructed as to get dismantled or move around as such for rearrangements or placed on wheels to make them mobile.

c) Light duty equipment: It can be more easily handled and moved around or placed anywhere when required for use. It is light to use, generally smaller in size than the heavy or medium equipment.

2. Order of use: The steps involved in the production of meals is the basis for this classification.

a) Receiving equipment: These include receiving platform, weighing scales, trolleys and so on.

b) Storage equipment: These include racks, shelves, bins, jars and portable bins for storing cereals and pulses. These are more convenient to use and keep clean.

c) Kitchen equipment: These include all items necessary for the preparation, cooking, holding and serving of foods and washing up.

Kitchen equipment therefore consist of

Tables or work sunfaces	: Peeling, cutting, grating and slicing equipment
Cooking	: Oven, grill, cooking range, hot plate, chappti - puffer.
Holding and serving	: Hot cases, casseroles, serving dishes, trays, crockery and cutlery
Washing	: Sink units, dish washers, driers
Waste disposal	: Open dumps, closed bins, sealed bags and incinerators.

3. Mode of Operation

a) Fully hand-operated : It consists of mechanical pieces such as beaters or whisks, hand slicers, which require greater effort to use than the semi-automatic types.

b) Semi-automatic types: These use electrical energy but need to be monitored carefully. These include mixers, electric whisks, fryers etc.

c) Automatic types: These include sophisticated equipment with thermostatic controls and timers, which can be adjusted to required times and temperatures.

Semi-automatic and automatic types are motorised and therefore require less attention and effort to operate. Whatever may be the method of classifying equipment, it is important to remember that every food service establishment will have different needs in terms of size, members and types of equipment required. A number of multi use equipment are also available and used in food preparation and service.

Selection of Equipment

Some basic factors are important in making decisions for selection of equipment for any catering establishment. These include

a) Size and type of the establishment

b) Menu

c) Usage

d) Utility in terms of design and frequency of use

e) Price

f) Ease of installation, maintenance and operation

g) Safety

h) Economy

i) Ease of cleaning

j) Attractiveness and

k) Source of supply

a) Size and type of the establishment

Size refers not only the spatial measurements of the structure or premises for food preparation and service activity but also to the number of customers that must be catered at one time. Thus selection of equipment is directly affected by the volume of food prepared, as this is related to the size or capacity of the particular piece of equipment.

The smaller the size of the establishment the more important it becomes to select equipment which is mobile and has the ability to be flat packed and stored when not in use. These charactistics enable the limited space to be utlilized to the maximum. Today a variety of equipment are designed so that parts of one can be used interchangeably with another. These are refered to as modular equipment and are very useful where size of establishment is small and the number of equipment that can be installed need to be limited.

For small or medium sized establishments it is a good idea to select multifunction equipment such as griddles which can be used for making dosas, eggs, chapptis and cutlets. The space in which the equipment is to be installed will also determine the size,

shape and capacity to select. While selecting designs of equipment to suit individual food preparation and service requirements, it is wise to maintain harmony with the general plan of the building. The type of establishment reflects the extent of service offered to customers in terms of the quantities and different types of foods prepared and served at one time. However, selection of equipment must not only be based on sizes for present needs but also for future expansion of the food service establishment.

b) Menu

Equipment also depends on the methods of cooking required for the dishes planned to be served. For instance, if a canteen menu consists mainly of snacks and beverages, the selection will be between investing on a fryer or a simple “Kadai”. On the other hand if the menu consists of ready baked items, sauted or shallow fried snacks and sandwiches, a fryer would be unnecessary.

The form in which the food is purchased will further influence the selection of equipment for any establishment. For example, if ready idli, vada, dosa mixes are purchased for preparing the dishes for a particular menu, then no need for a wet grinder. It may be necessary if the mixtures are prepared from raw ingredients. It must, however be remembered that while menus can be changed easily, changing equipment is expensive. Its selection therefore needs to be carefully planned to provide menu flexibilities. Multifunction equipment are good choices and can easily take care of menu variations.

c) Usage

Every equipment selected must be able to fulfil a specfic purpose, efficiency of production, profitability, convienience or customer satisfaction in terms of aesthetically presented meals, greater value for money or comfortable serving and dining. There are a number of space and labour - saving equipment available in the market which can perform different functions simply by the use of the attachments to the main machine. Multifunction devices are ideal for small outlets like coffee shops, canteens or lunchrooms.

d) Utility of Design

The design of a piece of equipment has to be considered in terms of the results desired. The selection of an equipment will be affected by its frequency of use. The degree of automation and standardisation required in terms of selecting gadgets or labour saving devices will depend on factors like the expectation of the customers and the availability of labour for the catering establishment. In some locations where labour is cheap and easily available for doing repetitive jobs it might not be desirable to invest on high automated equipment.

e) Price

The cost of a piece of equipment almost always determines buying choice. The materials of which an equipment is made affect its price and rate of depreciation along with sanitation, satisfication and usefulness interms of suitability and hard wearing qualities. The investment cost of an equipment has to be weighed carefully against the cost of time and effort saved in using it for better production in terms of quality and quantity of the

product. Selection is also guided by the funds available to the buyer over a period of time. The larger the budget, the wider becomes the choice of the buyer.

f) Ease of installation, maintenance and operation

It is more expensive to buy equipment which needs a specialist's attention each time when something goes wrong. Selection of equipment must be guided by simplicity of construction, ease with which it can be operated using existing skills of catering staff and the factors which are important to hygiene and safety of both equipment and its environment factors. Such factors are the material from which the equipment is made, the nature of the constitution in terms of rounded edges, proper insulation, earthing and plumbing as the case may be.

As far as the operation is concerned, most catering staff should be able to acquire the skills to operate equipment quite easily. If sophisticated autocontrols are provided then the personnnel need to be trained in their use.

g) Safety

Since catering involves dealing with heavy equipment, sharp tools, glass and cutlery, large volumes on food, electricity, gas and hot and cold water, it is extremely important to select equipment that is generated for safety while in operation and when not in use. All edged and movable parts should be provided with safety guards.

h) Economy

Economy refers to the amount of fuel in terms of electricity, gas and coal, which an equipment may require for functioning. The operating costs of a piece of equipment is an important consideration in its selection. It would be wiser to select equipment with higher initial costs and lower maintenance costs than to go in for cheaper models which have higher recurring costs. The availability of spare parts for the equipment in case of need for replacement is also an important consideration for selection.

i) Ease of cleaning

Selected equipment should be of materials which are non-corrosive, non-toxic, stable to heat and moisture and non-absorbent. All equipment should have smooth surfaces, not requiring any special detergents for its cleaning. Too much shiny chrome on equipment look altractive when new but involves extra effort and time in wiping and polishing. Some of the metals used in production of equipments are copper, aluminium, polyethylene and galvanized steel. Non - corrosive metals like silver plate, glass or ceramic and mud pots are some of the other types of materials used in equipment production. Each have its own advantages and drawbacks.

j) Attractiveness

The aesthetic quality of equipment attract a worker's attention to it and create a desire for using and looking after it. For instance, vegetable preparation in the centre of a kitchen where the monotony of peeling and cutting grows progressively, the introduction of

a vegetable peeling machine makes the job a bit more varied and less cumbersome. Dishwasher can help to create a interest in the dishwasing area.

k) Source of supply

Equipments must be obtained from manufacturers and suppliers of repute so that it is backed by a guarantee. They also ensure prompt after sales service and maintenance when required. All equipment selected must be checked for seals and labels indicative of quality. It is advisable to check with other users if a new model is being selected, to get an opinion on the usefulness and efficiency or possible drawbacks of the equipment in use before purchasing.

Equipment properly selected will reduce the drudgery of routine jobs, make "Messy" jobs more organised and improve the hygiene and sanitation standards of the working environment.

Equipment for preparation

1. Tools for measuring: consistent success in preparation demands accurate measurements. Measuring spoons and cups etc are commonly used as measuring tools.

2. Tools for stirring, dipping and turning

• **Spoons** - These are normally made of stainless steel and other metals. Nylon coated or Teflon coated spoons are often recommended to preserve non-stick utensil linings.

• **Laddles -** These are useful for serving soups or stews, for stirring etc. They may be cup like, flat, perforated etc.

• **Turners -** These are generally used for lifting or turning tender foods. They are flexible with broad blades. If the tool is perforated, foods may be drained as they are lifted.

• **Spatulas -** These are used for loosening cakes from pans.

• **Tongs -** They are specially used for turning meats without piercing them.

3. Tools for mixing and blending

Mixing may involve the simple combination of ingredients for a casserole and whisks need no more than a fork or a spoon. For other tastes such as whipping cream or beating butter, a hand or electric mixer may be needed. Bowls, forks, spoons, whisks or beaters are all used for mixing.

• **Rotatory beaters :** These are used to blend or mix various foods. They can be manually or electrically operated.

• **Whisks:** These are used for beating egg whites, blending cream, sauces or any quick light duty mixing job. For these a wire whisk is a handy tool.

• **Blenders**: They are used for mixing drinks and dressing, reconstituting frozen foods or dry milk solids. They are also used to grate, chop or puree almost any food, blend sauces and even liquify certain foods. They are ideal to prepare baby foods and soft diet foods.

• **Food Cutter:** It is a common non-cooking piece of equipment. The equipment consists

of a bowl that revolves rapidly around stationary blades. The blades and part of the bowl are covered with a hood for safety. The cutter may be purchased with added features for slicing, grinding, cubing and scrubbing. For cleanning the cover, lift up and the bowl can be removed. All electric equipment should be disconnected before cleaning begins.

• **Food slicers:** They are available in a variety of models from the conventional to the fully electronically controlled machines. Where portion control is stressed, a slicer will automatically stop when the predetermined amount has been sliced.

• **Peelers:** The equipment is used to peel potatoes and other root vegetables with minimum waste by action on a revolving abrasive disc. The machine should be located near a water source and sink so that vegetables can be emptied directly into sink for further preparation. After each use, the inside of the peeler and disc should be flushed with water to remove all parings and sediments. Rinse and sanitize the peel tray and all parts to air-dry.

Miscellaneous tools

Slicers, colanders, strainers, sifters, cutting board, rolling pins and knives are included here. Knives like paring knives, utility knives, french knives, carving knives, slicing knives and butcher knives and cleavers are used.

Storage Equipment

Refrigerator

A refrigerator is a chamber in which food and other perishable products are kept at a lower temperature in order to delay the growth of bacteria.

Since the preservation of food is the main purpose of the refrigeration, it must be kept spotlessly clean and dry, at all times, Food spilled inside should be cleaned up immediately, shelves and walls should be kept free from moisture, fresh vegetables and fruits should be wrapped in polythene bags or plastic boxes.

Cooking Equipment

Stoves: A large variety of stoves are available, operated by gas, electricity, solid fuel, oil and microwave.

Microwave cookers: Microwave is a method of cooking and heating food by using high frequency waves.

Ovens: Ovens are lined with dark coat of porcelain enamel. These produce a circulating current of hot air, which is rapidly forced around the inside of the oven by a motorized fan or blower.

Steam cooker and cabinet cooker: Steam may be supplied from a central heating plant directly connected to the equipment or steam may be generated at point of use, which requires water connection and heating it from the steam. Steam inducted into cooking chambers comes in direct contact with food and has gaskets to seal. This is known as cabinet cookers.

Pressure cooker and pans: Cooking food under pressure is fast and it is cooked at high temperature. Sealing ring is most important.

Egg cookers: Automatically timed egg cookers may be heated by steam or gas or electricity.

Other cooking equipment are milk and rice cookers, sauce pan, frypan, toaster, roaster and coffee makers.

Serving Equipment

Some of the serving equipment are utensils, spoons laddles forks, and cutleries.

Number, type and size of equipment

The total number of meals served at any mealtime, and the menu composition help to determine the quantities of various dishes to be produced. The size and type of holding and reheating or finishing equipment is necessary in a service area. For seating, furniture may be fixed along the sides of dining rooms or purchased as adjustable tables which can be used both for seating and standing arrangements required.

Cleaning Equipment

Some of the cleaning equipment used in food service institutions are dish washer, vaccum cleaner, brooms, brushes, mops and sponges.

Care and maintenance of Equipment

All equipment large or small, heavy or light, requires care in handling, use and storage in order to extend its life to the maximum, minimize depreciation and maintain it in a reasonably attractive and efficient condition while in use. The schedule below is a guide for the general care of most equipment.

- Keep all equipment clean
- Wash removable parts of equipment with suitable detergents and hot water after each use. After washing wipe equipment completety dry before replacing
- All small equipment like cutlery, laddles, chopping boards, kitchen tools etc should be washed and replaced in drawers and racks built for the purpose and covered to prevent them from dust and dirt during storage.
- Check that all pieces are in working order. Close supervision at work is necessary to ensure careful handling and to detect any deviations from effective operation, like an unusual sound, or fusing of waring lights or ineffective thermostatic controls.
- Reparis must be attended to without delay to prevent the equipment from giving way and disrupting work for any period of time.
- A weekly, fort nighlty or monthly programme for oiling or serving the equipment to maintain movable parts or machinary in order, is important.
- All electrical inputs to the equipment should be checked periodically to ensure the proper electrical load is available for efficient functioning.
- Insulations, plumbing and other connections need periodic checks to keep

equipment running at optimum efficiency.

- Make full use of warranty periods to help and train organisation staff to learn regular mainteance procedures from the manfacturer's engineers.
- Assign the care of each machine to one responsible person.

Money, time and effort spent on care helps to maintain equipment in continuous working order.

Food Service Equipment

5.4. Food Production - Standardisation of Recipes and Portion Control

Food Production

Food production, whether for four persons or forty, is basically the same in terms of the quality desired by the consumer. Food production encompasses the preparation of a large variety of items ranging from appetisers to curries, roasts, sandwiches, snacks, salads, vegetables and beverages. For each type of item, certain skills are needed and different methods of processing are required to produce different effects.

Food Production System

Food can be produced in quantity through different ways, varying with the policy, size and type of catering establishment. There are basically three types of food production system.

a) Conventional Food Systems: In this system food is produced totally from raw ingredients processed on the premises prior to service. Most small catering establishiments and institutional kitchens follow this system in India.

b) Convenience System: In this method of food production some of the food and ingredients used are bought prepared or pre-portioned from the markets. Some of the items like soups, noodles, marinated chicken, tandoori items require only finishing at the time of service, while others may be completely ready to serve not requiring processing at all. The latter include ice-creams, sauces, salad dressings, fruit, yoghurts and sweets.

c) Ready Food System: In this, the production of food is done, continuously everyday, with no peaks and troughs. The system involves preparation of food into ready portions of individual food items or cooked dishes, which are then sealed and chilled, frozen and stored for use as and when required.

Food Production Process

1. Collecting ingredients: In large quantity food preparation, collection of ingredients is done on the day previous to preparation. Timely collection also enables early preparation for next morning. This helps to start off the next day without wasting time, in addition to distributing work evenly throughout the day.

2. Weighing and measuring: In order to reproduce a popular dish each time it is important to weigh and measure ingredients accurately. Standard recipes are necessary for producing food in large quantities.

3. Preparation of foods: All foods have to be prepared to some extent before they can be used immediately, stored, cooked or served. The process of preparation generally involves like peeling, scraping, paring, cutting, grating, grinding, washing, sprouting, mixing serving and so on.

4. Holding Techniques: Every food service establishment requires to hold prepared food for varying periods of time before it is served. The basic principles underlying the holding of foods are

- To maintain them at temperatures which prevent microbial activity and ensure for their safety for consumption. As a general rule, it would be safe to serve hot foods boiling hot and cold foods really chilled or frozen.
- Holding techniques must maintain the quality characteristics of food such as quantitative, sensory and nutritional.

Food production thus involves stringent measures and close supervision at every step to ensure that the food obtained, prepared, held and served is wholesome and safe for consumption.

Standardisation of Recipes:

One of the tools for quality assurance control is the standardized recipe or formula. Recipes that have been tested for quality, quantity, procedures, time, temperatuare, equipment and yield are called standardised recipes. A recipe is considered standardised when it has been tried in a given situation and has repeatedly produced good results. Standarised recipes assured quality control and are effective management tools. A standard recipe is a written programme for producing a particular menu item, specifying the name and quantity of the item to be produced, the constituent, ingredients necessary for its production and the method of production. It may include the costing of the dish, its nutritional value etc. The standardised recipe is the backbone of institutional food service, and it is used in most successful restaurants as well. The principle features of a standardised recipe is as follows:

- the recipe is written in a simple, understandable language.
- the recipe should be presented in easy to read form
- the recipe uses standard units
- standardisation calls for careful assessment, testing and evaluation of recipes before final adoption

Advantages of standardised recipes

Standardised recipes offer several advantages

- Details of ingredients, procedures and equipment to be used. Thus a change in personnel does not affect food quality or quantity.
- Facilitate cost analysis of the recipes. Accurate food costings can be determined for particular dishes and from this the cost per portions may be calculated.
- Provide predictable food quality. It gives complete direction to prepare a recipe which assured good results.
- Standard recipes are an aid to menu planning by new additions to the menus or it can be balanced with other items on the menus, not only in terms of price, but also in appearance, flavour, colour, taste etc.
- They act as safe guard against pilferage and wastage in the kitchen. It aids in uniform production of food items with minimum time and expenditure.
- Standard yield determines the most appropriate and advantageous size/ weight to buy a particular commodity.
- They assist in determining the raw materials requirement and act as a “double check” for the purchasing department.
- Help in work scheduling, since time and procedures used are standardized. Efficient scheduling results in an even distribution of work and job satisfaction.
- In certain institutions like hospitals it is important to know nutritional value. By itemizing the ingredients for a particular dish, its nutritional value can be easily calculated.

- Avoid confusion and reduce the chances of poor handling and food preparation failures.
- Reduced record keeping - a collection of standardized recipes for menu items will reduce the amount of information required on a daily food production record. The food production will only need to reference the recipe, number of planning servings and left over amounts.

Recipe Card

A recipe card gives the following details:

Name of the recipe, portion size, number of portions, pan size and equipment to be used, list of ingredients in the order of combining with quantities, clean and concise directions for combining ingredients and finally time and temperature of cooking.

Standardization Procedures

The standardization of recipes need careful evaluation and testing. In many food service operations, it is undertaken by management with the help of supervisors and dietitians. Household recipes or small quantity recipes published in magazines or cook books usually are unavailable for quantity production. Every recipe that has been standardized needs reevaluation from time to time.

Standardization involves careful adjustment and readjustment of ingredients and their proportions to produce the most acceptable quality. Taste tests should be conducted several times until quality products are assumed. Most often recipes are enlarged and tested from smaller quantity recipes. The initial recipe may come from one of various sources such as cook books, magazines, journals, commercial food companies and other food service operations. The first step is to prepare the recipe in the minimum quantity for which it was extended. The finished product should then be evaluated. The smaller recipe should be evaluated on the basis of preparation method; ingredient proportion; availability of ingredients; cost, yield, equipment skill and abilities of personnel; and its overall suitability for the operation. A careful screening at this point will eliminate expensive large-scale testing at a later stage.

Enlarging Recipes

The original recipe should be multiplied and listed. In enlarging the recipe, ratios play an important role. For example, the ratio between sugar and flour is very important. The physical form of the ingredients should be carefully assessed. Fresh, chopped onions may be responsible for flavour in a smaller recipe, but it may not be feasible to have chopped onions in larger quantities, as this may change the taste of the finished product. Salt and seasonings need very careful assessment because simple multiplications never work for them.

In general there are two methods that may be followed to enlarge recipes; the trial and error method and the factor method. Final responsibility for the preparation of palatable, safe, nutritious and attractive foods rest with the food production manager who is incharge for quality production.

Phases of Recipe Standardisation

1. Recipe Verification Phase

The first phase of the recipe standardisation process is the recipe verification phase. This phase includes from major processes:

- review the recipe
- prepare the recipe
- verify the recipe yield and
- record changes to the recipe

2. Product Evaluation Phase

Product evaluation follows the recipe verification phase and is important part of the recipe standardization process. It will help to determine the acceptability of the recipe and will provide objective information that can be used to further improve the recipe. Formal and informal evaluation of recipe can be done by the manager, food service staff members and customers. Besides these students, teachers, administrators and parents can be included.

3. Quantity Adjustment Phase

When a recipe has been evaluated positively in the evaluation phase but it is not in desired quantity, it would move to the quantity adjustment phase of recipe standardization. There are several methods that can be used to adjust a recipe to get the desired number of servings. Some methods are done manually; others involve use of the computer.

Portion Control

Standardized recipes require effective portion control. The dependable method to use when measuring portions is to serve food using standard utensils such as ladles, scoops and other equipment. Portion control means giving a definite quantity of good food well processed and properly served in the right atmosphere for a definite price to ensure a definite margin of profit in return for the money, time, labour and interest that have been expended.

Portion control may be defined as the amount or size of a portion of food which is served to each customer. The purpose is to satisfy customer's demand and to control food costs within set down specifications. If the portion is too small, then the customer feels cheated at not getting value for money and will not return to the establishment. If the portion is too big, then the food cost will be greater than the planned price, thus affecting profits. Thus portion control is important not only in the control of costs but also in creating and maintaining guest or customer satisfaction and goodwill. Planning the size of portions to be served depends on type of establishment, menu and customer, quality of food and the prices charged.

Buying Tips

Portion control is closely linked with the buying of food. Only with a sound knowledge of the food bought it is possible to work out exactly how many portions can be obtained from it. Buying tips to consider when buying food that will assist portion control include:

- Keep an up-to-date list of all fresh and dry goods required by the kitchen and their prices. Check prices continually to ensure buying at the best price.
- Be aware of different types and qualities of each item.
- Be aware of the availability of part-prepared and ready-prepared fresh items.
- Be aware of the right time to buy at the best price, which, for fresh goods, is when the item is at the height of it season.

The most commonly used portion control devices are described below:

Standard sized pans: Permit portion to be cut or served as needed. Cake pans with specified number of pieces or loaf pans with specified number of portion should be used.

Ladles that are labelled in cups may be used for serving soups, creamed dishes, gravies, stews and sauces.

Serving spoons: Solid or perforated spoons may be used, but since they are not specified by number, it is necessary to measure or weigh food to obtain approximate serving size desired.

Soups may be used for portioning such items as drop cookies, muffins, meat, vegetable salads and sandwich fillings. The number on the scoop (usually on the rim) indicates the number of scoopfuls it takes to make one quart.

Scoop numbers and their equivalent measures are given below:

Scoops	Cups
6	2/3
8	1/2
10	2/5
12	1/3
16	1/4

It is important to know the equivalent weight and measures for implementing portion control. The most commonly used equivalents are given below:

3 teaspoons	=	1 tablespoon
16 teaspoons	=	1 cup
2 cups	=	1 pint
2 pints	=	1 quart
4 quarts	=	1 gallon
16 ounces	=	1 pound

Standard serving portions of some dishes

Dish	Portion size	Indication on portion guide
Soup	250 ml	1 soup bowl or 2 laddles
Rice	100 - 150 ml	1 laddle
Vegetables	50 - 75g	Two chops
Meat	50 - 75g	2 fillets
Fish	50 - 75g	2 fillets
Chicken	200 - 250g	1 bowl or 2 laddles
Curry	200 - 250g	1 laddle
Sauce	50ml	1 scoop
Cake	50g	2 pieces
Snacks	50 - 100g	2 pieces

Portion control should be closely linked with the buying of the food. Without a good knowledge of the food bought, it is difficult to state fairly how many portions should be obtained from it. To evolve a sound system of portion control, each establishment needs individual consideration. A golden rule should be “a fair portion for a fair price”.

Chefs at Service

Questions

PART - A

I.A) Choose the Correct Answer

1. ____________ form the backborne of the tourist and trade

   a) Catering Institutions   b) Educational Institutions   c) Industries

2. Catering is an act of providing food and drink ____________

   a) Aesthetically   b) Scientifically   c) Aesthetically and scientifically

3. The customer is the ____________ in commercial catering

   a) King   b) Head   c) Chief

4. The idea of ____________ is fairly new in India.

   a) Pubs   b) Motels   c) Hotels

5. ____________ is an aid used by managers for effective management.

   a) Tools of management   b) Organization chart   c) Work schedule

6. ____________ refers to the definition of a job in a precise manner.

   a) Job specification   b) Job description   c) Job summary

7. ____________ refers to peak hours of production and service

   a) 10.00 am to 2.00 pm   b) 11.00 am to 2.00 pm   c) 12.00 pm to 2.00 pm

8. ____________ is an example for mixer

   a) Mixie   b) Whisks   c) Beater

9. ____________ are used for loosening cakes from pans

   a) Knives   b) Spatula   c) Forks

10. Specialists are included in ____________ of organisation.

    a) Line type   b) Line and staff type   c) Vertical type

B) Answer in one or two sentences

1. Define catering
2. Classify catering Institutions.
3. What is organization chart.
4. What is job description?
5. List cooking equipment.
6. What is the use of rotatory beaters?
7. List serving equipment.
8. Write about tongs.
9. What are Pubs?
10. What is the use of whisks?

PART - B

II. Answer in five lines

1. Write short notes on industrial catering.
2. Vertical structure of food service organization.
3. What are the advantages of work in peak hour?
4. Write down the classification of equipment.
5. What is the use of peelers?
6. Write about cabinet cooker.
7. Ready food system - Write short notes.
8. Write about recipe card.
9. List the buying tips.
10. How will you select equipment?

PART - C

III. Answer should not exceed one page

1. Explain the principles for guiding catering operations.
2. Write down the example for job specification.
3. List and write about tools for mixing and blending.
4. Explain the steps in food production process.
5. Write about the general care and maintenance of equipment.

PART - D

IV. Answer in Detail

1. Explain non-commercial catering or welfare or subsidised catering.
2. Tabulate the main tools of management.
3. Explain the sample of time schedule for staff and its need.
4. Explain the important features and advantages of a standardized recipe.
5. Explain the objectives of catering and factors affecting the growth of catering Institutions.
6. What is job description? Explain the job of head chef.

6. FOOD BORNE INFECTIONS AND FOOD POISONING

6.1. Food Borne Infections - Micro Organisms - Causes and Effects

A large part of our income is spent on food only. Food that is consumed should be safe and wholesome. It should be free from toxicants and infections. The presence of these in food may or may not be noticed by a common man. Food which is contaminated by toxicants and infectious agents is capable of causing illness. The degree of illness caused is dependent upon the state of the health of the individual, the amount of contaminated food consumed and the strength or potency of the toxic materials present. Diseases transmitted through food can be classified into following parts.

Causes of Illness

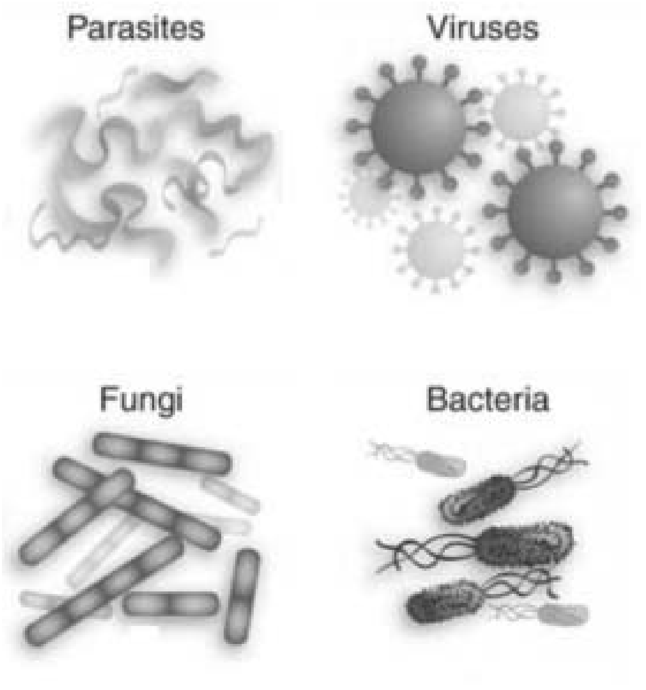
A) Food – borne intoxications

i. Poisoning due to naturally present poisons in plants and animals

ii. Food borne chemical poisoning
- Accidental
- With malicious intention to cause harm (adulteration)

iii. Food borne bacterial poisoning or intoxication
- Botulism
- Staphylococcus poisoning

B) Food borne Infections



i. By micro organisms
- Salmonellosis
- Typhoid
- Cholera
- Diphtheria
- Shigellosis
- Amoebiasis
- Tuberculosis

ii. By animal parasites
- Trichinosis
- Ascariasis (Round worms)
- Tape worms
- Thread worms
- Flukes

iii. Fungal Infections
- Those in which food does not ordinarily support growth of the pathogens but also carries them (worms, dysentery, jaundice).

- Those in which the food can serve as culture media for the growth of the pathogens. (Salmonella and Strepto coccus infections)

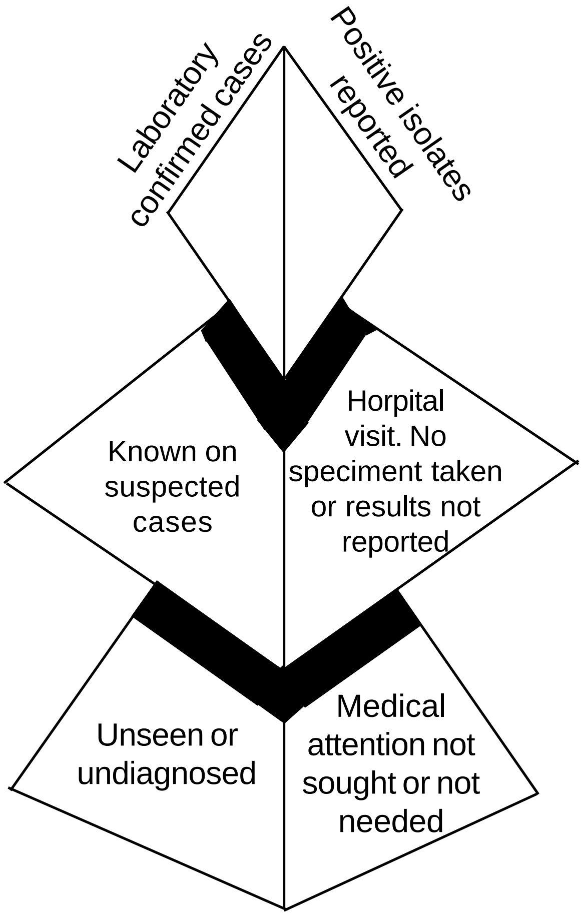
Food Borne Infection

Definition

Food borne infection or disease has been defined by WHO as a disease of an infectious or toxic nature caused by or thought to be caused by the consumption of food or water.

It is a widespread problem in the contemporary world and an important cause of reduced economic productivity. Statistics covering food borne illness are notoriously unreliable. Simply quantifying the problem of those disease initiated by infection through the gastrointestinal tract is difficult enough, but to determine in what proportion food acted as the vehicle is harder till. The foods that are most frequently incriminated in food borne disease are those of animal origin for example meat, poultry, milk, eggs, and products derived from them. Outbreaks can result from the distribution of a contaminated food product or from situations where meals are being produced for large number of people.

The Food Poisoning Pyramid



It is reasonable to assume that the more ill you feel, the more likely you are to seek medical attention and the more likely your case is to figure in official statistics. The situation can be represented as a pyramid, where the large base reflects the true incidence of food poisoning which is reduced to a small apex of official statistics by the various factors that contribute to under reporting as shown in the pyramid.

Food and water form major media for the entry of disease organism or agents into an individual commonly known as the host. If the host is weak, the agent will cause disease symptoms in him. Invasion by disease organism is resisted by a healthy individual. Improper disposal of waste is often responsible for the spread of disease of the type.

Food borne diseases are associated with low standards of personal and public hygiene. These diseases can be controlled and eradicated through education and improving of living standards.

A) Diseases caused by Bacteria: Some of the food borne bacterial diseases are as follows.

1. Typhoid and paratyphoid:

- These are collectively known as enteric fevers.
- Paratyphoid is caused by Bacillus paratyphus A, B, or C, while typhoid is caused by Bacillus typhus.
- These are salmonella infections, when viewed through a microscope the organism can be seen as rods with flagella arising out of the cell membrane .
- These bacteria move due to the presence of the flagella. Housefly also spreads the disease. Consumption of contaminated food and water leads to this disease. The incubation period of the disease is 10-14 days.

Symptoms:

- Initial symptoms are head ache and backache.
- There is steady rise of temperature.
- The tongue is furry; coated and is dry.
- The pulse rate is slow in comparison to the high temperature.
- The disease organism attack the lymphoid follicles and enters the blood stream from the intestine.
- The disease organism can be detected in the urine and faeces.
- Diarrhoea and exhaustion.
- Abdominal tenderness and enlargement of spleen.
- An attack of typhoid gives long lasting immunity.

Preventive Measures

- Isolation of the patient and sanitary disposal of body wastes from the patient.
- The stool and urine receptacles should be disinfected with carbolic acid.

- Very careful nursing and feeding under strict medical supervision is essential to avoid any possible relapse.
- Destruction of flies and protection of all the food is necessary.
- Drinking water, milk and food should be properly boiled and cooked.
- T.A.B. vaccine is a must.

2. Cholera: • Cholera is caused by a bacteria commonly known as Vibrio cholerae. They have 1-2 flagella and are motile.

- It does not survive long in water but grows well outside the body in soil and waste materials.
- The incubation period varies few hours to three days.
- It spreads indirectly through the housefly and carriers. Indiscriminate disposal of waste and lack of personal cleanliness are main causes.

Symptoms: •The disease is characterized by acute watery diarrhoea, vomiting, cramps in the legs and suppression of urine followed by rapid dehydration and great thirst.

- The stools are thin like rice water and may be accompanied by pain in the stomach.
- If not controlled in time, the patient may collapse.

Preventive Measures: • Anticholera inoculation provide immunity and should be taken regularly.

- Isolating the patient.
- The body wastes should be safely disposed off.
- Drains and latrines should be properly cleaned.
- Antifly measures and use of disinfectants are necessary.
- Avoid consuming all exposed foods and drinking water without boiling.
- Sour drinks should be taken since acidity in stomach is good to kill the disease organism.

3. Diphtheria: • This disease spreads mainly through droplet infections, but fomites, infected milk and food also transmit this disease.

- It is caused by Coryne bacterium diphtheriae. The bacteria gets killed by heat and sunlight. The incubation period is usually from 2-5 days.

Symptoms: •This infectious disease is characterized by fever, cough and formation of a false, grey white membrane or mucous membrane of throat.

- The nose and larynx may also get affected.
- The bacteria produces a toxin which is injurious to the nervous and cardiac systems. This toxin is absorbed by the blood.
- In severe cases swallowing is difficult and may cause death.

Preventive Measures: • By giving D.P.T. vaccine.

- Isolation of the patient

- Disinfection of the house and clothing is essential.
- Gargle frequently with antiseptics to keep their throats clear.
- Patient should take complete rest.

4. Dysentery: There are two types,

1. Bacillary dysentery
2. Amoebic dysentery

1. Bacillary dysentery: It is caused by shigella group of organisms. They are motile and are found in the faeces of sick persons.

2. Amoebic dysentery: It is caused by Entamoeba histolytica. These protozoa are parasitic in man. Thus infection may spread through these cysts, transmitted to the host by dirty hand, contaminated water and food. The incubation period is from one week to several months.

Symptoms: • Severe gripping pain in the lower abdomen.

- Inflammation and probable ulceration of the large intestine.
- There will be diarrhoea and fever.
- The stool contains mucus and blood.
- If neglected the disease becomes chronic and difficult to treat.

Preventive Measures

- High level of personal cleanliness and environmental sanitation prevents this disease.
- Sanitary disposal of wastes and safe handling of food are essential.
- Prophylactic vaccine for bacillary dysentery is essential.

5. Tuberculosis

- This disease is caused by mycobacterium tuberculosis or the Tubercle bacillus.
- This disease spreads in two ways: by droplet infection - pulmonary tuberculosis involving he lungs and by consumption of milk from sick animals - bovine tuberculosis.
- The incubation period varies from several months to years.

Symptoms: • A person suffering from the disease gets easily tired and fatigued.

- The person develops a husky cough and voice becomes hoarse.
- Rapid pulse, palpitation and sweating.
- Pain in the chest and haemoptysis, coughing up of blood.
- General wasting of the body tissues, dark spots on the lungs.

Preventive Measures: • A person should take a good diet and live in a clean and well ventilated place.

- The discharge from the mouth and nose should be carefully disposed off.
- Environmental sanitation is a must.
- B.C.G. (Bacillus Calmette Guerin) vaccination provides immunity against tuberculosis.

6. Jaundice: • This disease is caused by Hepatitis A,B viruses.

- The organism enters the body through cuts in skin and by consuming food which is infected by rat urine and rat droppings.
- It is caused by virus which damages the liver.
- The incubation period is usually 9-10 days.

Symptoms: • Loss of appetite, nausea, vomiting and tenderness of liver and spleen.

- The liver and spleen get enlarged and fever occurs.
- Pale to dark yellow brown urine, yellowing of skin and eyes are usual features present in a jaundice patient.

Preventive Measures: • It can be cured by dietary means

- Hepatitis virus vaccine is a must.

B) Diseases spread by Animal parasites:

Many diseases are caused by worms that live in the host as parasites. Some of the diseases are discussed here.

1. Ascariasis (Round worm Infection): •This disease is caused by Ascaris lumbricoides commonly known as round worm.

- The round worm gets nourishment from the blood and lymph of the host.
- The worm enters through improperly washed food and dirty hands.

Symptoms: • They pass through the intestinal walls into the blood vessels on the right side of the heart.

- When the larvae enters lungs and trachea they often damage the tissue and cause pneumonia.
- The larva in the intestine causes intestinal obstruction,
- Loss of appetite, paleness and abdominal pain and it may cause vomiting as well as asthmatic attacks.

Preventive Measures: • High standard of hygiene is important.

- Night soil should be carefully disposed off
- Salads and fruits eaten raw should be washed
- Proper cooking will destroy the eggs.

2. Tape Worm Infection: • The worm Taenia solium passes through pig and man and they are termed hosts.

- The pig becomes the intermediary host, when it feeds on faecal matter.

Symptoms: • Loss of appetite

- Abdominal pain and failure to grow.

Preventive Measures: • Thorough inspection and cooking of pork.

- Sanitary disposal of waste and personal sanitation are very important.

3. Hook worm (Ancylostomum duodenale) Infection

The disease is also known as ancylostmicusis.

- The larvae attain themselves to host by piercing through the epidermis.
- They reach the blood stream through the lymphatic system. From heart they go to the bronchial tubes and gets swallowed.
- The larvae attach themselves to the intestinal wall by means of hooks and cause haemorrhage.

Symptoms: • Abdominal pain with alternating diarrhoea and constipation is a common feature.

- Facial puffiness and oedema in the legs.
- Anaemia and general weakness occurs.

Preventive Measures: • Educating the public about sanitary habits.

- People should not walk on barefoot.
- Drinking water should be properly protected from contamination.

4. Thread Worm: Thread worm infection is common among children.

- The female worm emerges out at the anal end and deposit the eggs with perineal skin and the surrounding folds.
- They cause excessive irritation and local rash.
- The worm may enter the vagina of the female patient and cause vulvo-vaginitis.
- They are picked up by nails when the victim scratches and cause auto infection.
- The eggs may also be sticking to the personal clothing and bed linen.
- Improper personal hygiene and disposal of wastes increases the incidence of infection considerably.

Symptoms: • Causes cough, sleeplessness, disordered appetite, restlessness and in acute cases convulsions may also occur.

- Enuresis (uncontrolled passing of urine) is also quite common.

Preventive Measures: • Personal cleanliness is very important to rule out the chance of auto infection.

- Bed linen and patients clothing should be properly washed and sun dried.
- The anus can be smeared with dilute ammoniated mercury oinment before sleeping.
- Piperazine can be given orally to get rid of the worm.

5. Flukes: • When under cooked fish is eaten the embryos (flukes) find their way to man.

- The adult worms live in the portal blood vessels and veins.
- The diseases caused are urinary schistosomiasis and rectal schistosomiasis.

Symptoms: • Fever, tiredness and loss of appetite with pain and discomfort in the liver region of the abdomen.

Preventive Measures

- Sanitary disposal of faeces and urine
- Avoidance of bathing in dirty waters and filtration of the drinking water.

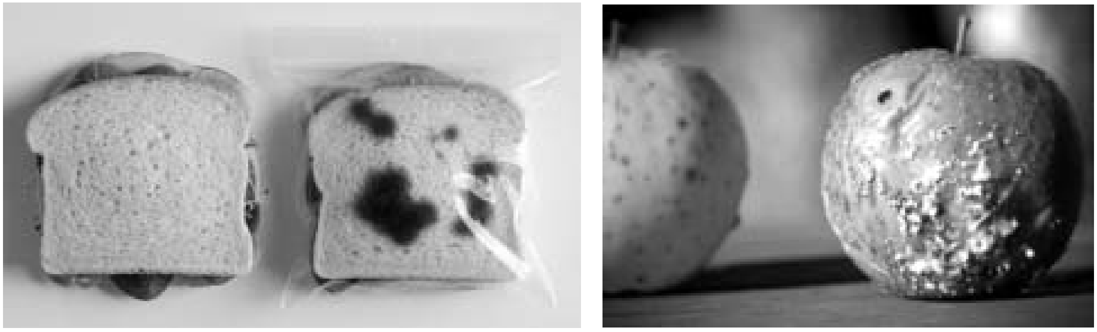
C) Fungal Infections: Fungi are plants devoid of chlorophyll. They are found in different shapes and sizes. Some fungi are saprophytic that is they grow on dead organic matter, while others are parasites. They can be parasites on living plants, animals and even on human beings. Some are harmful to man while others are beneficial.

1. Yeast: Yeast is an unicellular fungus. It is minute and looks like oval pin head when seen under a microscope. Each cell is oval in shape with cell wall, cytoplasam and nucleus present in it. It can be found in the air and soil when it gets blown away from the foods. It thrives well at temperatures between 25ºC and 30ºC. The yeast cells multiply by sexual reproduction, fission and budding. Unlike the bacteria, yeast spoils foods with low pH value. They produce pigments and undesirable chemical products during their metabolism. Yeasts live on fruit juices, syrup, molasses and other carbohydrate foods.

2. Mucor: Mucor is a saprophytic fungus and is commonly known as pinkmould. It grows on dung, wet shoes, rotten fruits, vegetables and moist bread.

The body looks like a white cottony mass of delicate threads and is known as the mycelium. It is without septa. Each individual cell is known as a hypha. Reproduction takes place by means of spores developed in the sporangium and can be seen arising off the mycelium.

3. Rhizopus: It is another saprophytic fungus and is commonly known as Black mould. This can be seen growing on decaying fruits, vegetables, old bread, jam and jelly. The mycelium has more than one sporangium and contains a number of spores. These spores when released spoil more food. They impart a musty and a mouldy flavour to the food on which they grow thus making it unfit for consumption. Food grains like bajra, jowar and wheat get infested with parasitic ergot fungus known as Claviceps purpurea. Table 6.1. presents the hazards caused by Fungal contamination.



Fungal Attack in Foods

Table 6.1: Hazards Caused by Fungal Contaminants Occurring in India.

Name of Fungus	Foods commonly involved	Causative agent of disease	Disease and symptoms
Claviceps purpurea (Ergot)	Bajra, Wheat, Jowar, Rye	Ergot alkaloids	Ergotism in man and animals
Fusarium spore Trichioides and others	Over wintered wheat, millet, oats, barley etc.	Toxins	Acute gastro enteritis, followed by progressive bone marrow destruction, fever, necrotic lesion in the mouth, and may end in death unless consumption of the toxic grain is stopped.
Aspergillus flavus	Groundnut, cotton seed and their cake, meat and oil, maize, wheat, rice, corn, soya beans etc.	Aflatoxins	Liver disease possibly liver cancer and cirrhosis in humans
Penicillium Islandicum	Rice	Islanditoxin	Acute and chronic liver damage, tumours and cancers.

Safeguarding of Food: Lack of proper attention to safe handling of food and neglect of personal hygiene requires serious attention. The incidence of food borne disease can be considerably reduced by certain healthy practices.

- Food should be cooked at high temperature to ensure that all bacteria are killed.
- All perishable foods should be kept in a cool place or in a refrigerator.
- Food should not be left uncovered and exposed to dust, flies and other modes of infection.
- Mouldy and foul smelling foods, preserved food from damaged and bulging tins and cans should never be consumed.
- Food should be carefully washed to ensure the removal of insecticide, worm eggs, and other parasites sticking to it.
- Vegetables and fruits can be washed with potassium permanganate before use.
- Care should be taken to keep the food and the utensils free from contamination by disease organisms.
- Food handlers should be healthy and free from disease.

- The drinking water should be boiled especially during the rainy season and epidemics.
- Avoid licking food with dirty fingers. Tasting spoons should not be returned back to clean food.
- The kitchen and storage facilities should be safe and adequate.

In the present day scenario it is essential to know about the organisms responsible for food born infections. The significance of the individual organisms varies from time to time reflecting differences in both diet and culinary practices. The food microbiologist must be continually vigilant and in anticipating the effect that changes in dietary preference and social behaviour and development in crop and animal husbandry and food processing may have on bacterial hazards.

6.2. Food Poisoning – Natural Toxicants in Foods, Microbial Toxins and Contaminants Arising from Processing

Food poisoning

Food poisoning is an acute gastro-enteritis by the ingestion of food or drink contaminated with bacteria or toxins.

The term "Food poisoning" is however restricted only to acute gastroenteritis due to bacterial pollution of food or drink. The term "Food borne disease" is defined as, "a disease usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food".

Apart from microbial agents, they may be contaminated through,

- the addition of poisons.
- eating of inherent poisonous substance such as certain mushrooms, fish and molasses by mistake.
- adulteration of food with poisonous substances such as Argemone Mexicana in mustard producing epidemic dropsy.

Types of Food Poisoning

Food poisoning may be of two types

a. Non-bacterial

b. Bacterial

a) Non-Bacterial: Caused by chemicals such as arsenic, certain plant and sea foods. Lathyrism and endemic ascitis are some diseases caused due to toxins in foods. In recent years, there has been a growing concern about contamination of food by chemicals. (eg.) Fertilizers, pesticides, cadmium, mercury.

b) Bacterial: caused by the ingestion of food contaminated by living bacteria or other toxins.

a) Non Bacterial Food Poisoning

1. Natural toxicants in foods:

Natural toxicants are generally considered to be compounds that occur naturally in foods derived from plants or animals. They are not regarded as contaminants, as they are inherent components of the organisms from which they are derived. An important example is legume – Lathyrus Sativus, which contains a toxin, when consumed in large amounts, the subjects develop a crippling disease known as lathyrism. Some varieties of mushrooms contain toxic substances which when consumed produce serious ill effects.

Tea and sea foods contain more quantity of fluoride than what is considered a normally safe intake. Foods which are grown in alkaline soils rich in selenium can lead to stunted growth, loss of appetite, loss of hair, gastro-intestinal disturbances and cirrhosis of the liver.

Injury and excessive exposure of potatoes to sunlight increases the solanine content of potatoes. Solanine poisoning causes vomiting, abdominal pain and diarrhoea.

Soyabeans contains trypsin inhibitor which accounts for its poor indigestibility. Intake of raw and under cooked soyabeans is toxic for the pancreas. This toxicity can be removed by proper and complete cooking.

Mushrooms grow wild in nature. The non-edible varieties contain a toxic substance known as Amantia Phalloids. The consumption of any toxic variety of mushroom may cause abdominal pain, intense thirst, nausea and vomiting.

Spinach, amaranth and other greens contain oxalic acid in small amounts. Excessive intake of these may cause kidney stones. Oxalic acid in large amounts is believed to interfere with the assimilation of calcium, magnesium, iron and copper in the body.

Raw egg white contain avidin. This binds with biotin making it unavailable to the body and gets inactivated by heat. Spices and flavouring agents should not be taken in excess because of the presence of toxic substances in them. Nutmeg and mace contain toxic narcotics.

b) Bacterial Food Poisoning

Certain bacteria, when present in food, produce toxins that are injurious to health. Improperly handled food may contain millions of bacterias. The infected food may look and smell normal yet when consumed will cause gastro-intestinal disturbances and vomiting.

1. Salmonella Food Poisoning

This is an extremely common form of poisoning.

Agent: Salmonella spp.

Causes:

- An increase in communal feeding
- A higher incidence of salmonellosis in farm animals.

- Wide spread use of household water contaminated with sewage
- Wide distribution of prepared foods

Source: Salmonellosis is primarily a disease of animals. Man gets the infection from farm animals and poultry – through contaminated meat, milk and milk products, sausages, custards, egg and egg products. Rats and mice are another source contaminating the food stuffs by their urine and faeces.

Incubation period: 12 to 24 hours.

Symptoms: The causative organisms, on ingestion multiply in the intestine and give rise to acute enteritis and colitis. The onset is generally sudden with chills, fever, nausea, vomiting and profuse watery diarrhoea which usually lasts 2-3 days.

Human carriers of salmonella – paratyphus bacillus cause paratyphoid fever.

2. Staphyloccoal Food Poisoning

Agent: Staphylococcus aureus

Source: Staphylococci present in air, boils, pimples and abrasions of skin. These bacteria are also often present in the nose and throat of food handlers. The foods involved are salads, custards, milk and milk products which get contaminated by staphylococci.

Incubation period: 1-6 hours.

Symptoms: The toxins act directly on the intestine and central nervous system. The illness becomes manifest by the sudden onset of vomiting, abdominal cramps and diarrhoea. In severe cases, blood and mucus may appear. Staphylococcal food poisoning rarely causes fever. Death is uncommon.

3. Botulism

This is most serious but rare. It kills two thirds of its victims.

Agent: Clostridium Botulinum

Source: The organism is widely distributed in soil, dust and the intestinal tract of animals, and enters food as spores. The foods most frequently responsible for botulism are home preserved foods such as home canned vegetables, smoked or pickled fish and home made cheese.

Incubation period: 12 to 36 hours.

Symptoms: It acts on the para sympathetic nervous system. Botulism differs from other forms of food poisoning in that the gastro intestinal symptoms are very slight. The prominent symptoms are dysphagia, head ache, fever, diarrhoea, nausea and vomiting. Botulism results in the paralysis of eyes, neck muscles, respiratory centres and finally death. However, if the person survives, the convalescence is long and slow.

4. Cl. Perfringens Food Poisoning

Agent: Clostridium Perfringens Welchie

Source: The organism has been found in faeces of human and animals and in soil, water and air. The majority of outbreaks have been associated with the ingestion of meat, meat dishes and poultry.

Incubation period: 6 to 24 hours with a peak from 10 to 14 hours.

Mechanism of Food Poisoning: The spores are able to survive in cooking and if the cooked meat and poultry are not cooled enough, they will grow. The organisms, multiply between 30º and 50ºC and produce a variety of toxins.

Symptoms: The most common symptoms are diarrhoea, abdominal cramps and little or no fever, occurring 8 to 24 hours after consumption of the food. Nausea and vomiting are rare. Illness is usually of short duration.

Prevention and Control

- **Sanitation:** Safe disposal of human excreta coupled with the elementary sanitary practice of washing hands after defecation and before eating is a crucial factor in the prevention and control of this disease.
- **Water supply:** The protection of water supplies against faecal contamination is equally important. Water filtration and boiling are more effective than chemical treatment of water.
- **Food hygiene:** Environmental measures should also include the protection of food and drink against faecal contamination.
- **Health education**: In the long term a great deal can be accompanied through health education of the public.

Contaminants Arising From Processing

Food contaminants are generally considered to be those substances present in food at levels which serve no technological function and whose presence may lead to adverse health effects.

The Codex Alimentarius commission defines a contaminant as " Any substance not intentionally added to food, which is present in such food as a result of production, manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food or as a result of environmental contamination". The term contaminant refers to both metal and non-metal substances agricultural chemicals and veterinary medicines, food additives and processing aids. Certain pesticides such as DDT, which are no longer intentionally applied to crops but are still found in foods are also regarded as contaminants.

Food processing has evolved away from natural preservation using salt, fermentation and sun drying into more complicated methods. Nearly six thousand additives and chemicals are used by food companies to process the food. Many of them can have a devastating effect on our health.

Colours Used in Foods

Many colouring agents are derived from coal tar and nearly all colouring is synthetic. They are believed to cause cancer, allergies, asthma and hyperactivity. Foods and beverages in which, colour is altered includes butter, margarine, potatoes, orange, popcorn, jellies, carbonated beverages, canned strawberries and peas.

Sweeteners

Most processed foods contain sweeteners, many of which are artificial sugar substitutes containing no natural sugars, such as saccharine etc. Artificial sweeteners are linked to behavioural problems, hyperactivity and allergies.

Emulsifiers, Stabilizers and Thickeners

Emulsifiers used in icecream and propylene glycol, a synthetic solvent used in foods are recognized as toxic to the skin and other senses and is considered a neurological toxicant.

Flavourings

Artificial flavours are linked to allergic and behavioural reactions. MSG (Monosodium glutamate) is a popular flavor used in foods. It causes common allergic and behavioural reactions including headaches, dizziness, chest pains and depression.

Refining

Refining flour has had the brown husk of the grain stripped away, leaving the white refined starch found in white bread, white rice, pasta, cookies and numerous other junk foods. Without the fibrous husk, refined starches are broken down quickly into sugar and absorbed immediately into the blood stream causing glucose levels to rise and increasing the risk of obesity.

Preservatives

Nitrates and nitrites are used to preserve meats such as ham and bacon, but are known to cause asthma, nausea, vomiting and headaches in some people. Benzoic acid is added to margarine, fruit juices and carbonated beverages. It can produce severe allergic reactions and even death in some people. Sulfur-di-oxide is a toxin used in dried fruits and molasses as well as to prevent brown spots on peeled fresh fruits. In this process, it destroys the vitamin B.

Coloured Candy

Preserved Ham

Questions

PART - A

I.A) Choose the Correct Answer

1. ____________ is a food borne infection by microorganisms.
   a) Typhoid b) Ascariasis c) Flukes
2. Typhoid and paratyphoid are collectivity known as ____________
   a) Enteric fever b) Cholera c) Shigallosis
3. Cholera is caused by a bacteria commonly known as ____________
   a) Vibrio cholerae b) Diphtheria Bacillus c) Hepatitis B
4. Tuberculosis can be prevented by ____________ vaccination
   a) BCG b) DPT c) MMR
5. ____________ passes through pig and man.
   a) Taenia solium b) Ascaris c) Hook worm
6. Mucor is commonly known as ____________
   a) Yeast b) Rhizopus c) Pink mold
7. Dysentery is caused by ____________
   a) Amoeba b) Staphylococcus c) Bacillus
8. ____________ is caused by Colostridum Bolulinum
   a) Botulism b) Typhoid c) Salmonellosis
9. Spinach, amaranth and other greens contain ____________
   a) Hydrochloric acid b) Sulphuric acid c) Oxalic acid
10. Typhoid and paratyphoid can be controlled by ____________
    a) DPT b) TAB c) BCG

B) Answer in one or two sentences

1. What is food poisoning?
2. Define food borne disease.
3. Write the causative organism for diphtheria.
4. What are the two types of dysentery?
5. What is enuresis?
6. Write the symptoms of tape worm infestation.
7. Write on fungi.
8. Write about black mold.
9. Give the types of food poisoning.
10. What is lathyrism?

PART - B

II. Answer in five lines

1. List the animal parasites that causes food borne infections.
2. What are the symptoms of diphtheria?
3. Write about jaundice.
4. Write short notes on yeast.
5. Explain natural toxicants in foods.
6. What is bacterial food poisoning?
7. Write about colours used in foods.
8. Write about rhizopus.
9. How will you prevent typhoid and paratyphoid?
10. Write about preservatives.

PART - C

III. Answer should not exceed one page

1. Draw the food poisoning pyramid.
2. What is typhoid? Write about symptoms of typhoid.
3. Explain the healthy practices for safeguarding food.
4. Discuss salmonella food poisoning.
5. Explain the contaminants arising from processing.

PART - D

IV. Answer in Detail

1. Explain about cholera, diphtheria, tuberculosis, jaundice under the following headings:
   a) Causes b) Symptoms c) Preventive measures
2. Write in detail about any two types of diseases spread by animal parasites.
3. Explain about fungal infections.
4. Discuss in detail about dysentery, Ascariasis, Staphylococcus infection.

7. FOOD PRESERVATION

7.1. Modern Technologies in Food Preservation - Irradiation and Microwave Heating

Both irradiation and microwave heating employ radiant energies which affect foods when their energy is absorbed, whereas ohmic heating raises the temperature of foods by passing electrical current through the food. Each requires special equipment to generate, control and focus this energy. Each of these are relatively new technologies as applied to foods.

Food irradiation is used primarily as a preservation method but it also has potential as a more general unit operation to produce specific changes in food materials.

Microwave energy on the other hand, has been employed especially to produce rapid and unique heating effects, one application of which can be food preservation.

Ohmic heating is the newest and least used of the three technologies. Like microwave heating ohmic heating can preserve foods by the application of heat and has the ability to very rapidly heat foods with minimal destruction.

Food irradiation: It is a process to preserve foods for extended periods by sterilisation, much as thermal processing does.

Irradiation is used for three purposes:

- It can be used as an alternative to chemical fumigation to control insects in foods such as spices and fruits and vegetables.
- It is used to inhibit sprouting or other self generating mechanisms of deterioration.
- It destroys the vegetative cells of microorganisms including those that cause human disease. This results in an increase in safety and shelf life.
- To extend shelf life of meat, poultry and sea foods by killing microorganisms causing their spoilage.

Radiation effects: Ionizing radiations penetrate food materials to varying degrees depending on the nature of the food and the characteristics of the radiations. Gamma rays have greater penetrating power than beta particles. Radiation has two types of effects namely,

1. Direct Effects
2. Indirect Effects

1. Direct Effects: In the case of living cells and tissues destructive effects and mutations from radiation were originally thought to be due primarily to direct contacts of high-energy rays and particles with vital centers of cells much as a bullet hits a specific target. The same theory of action was extended to explain change in the color or texture of a food due to direct collision of a gamma ray or high energy beta particle with a specific pigment or protein molecule.

2. Indirect Effects: In this case, water molecules are altered to yield highly reactive hydrogen and hydroxyl radicals. These radicals can react with each other, with dissolved oxygen in water and with many other organic and inorganic molecules and ions that may

be dissolved or suspened in the water. Since living cells and food materials are mostly water, the activity imparted to this solvent by radiation constitutes a most important factor.

In food irradiation the primary goal is to inactivate undesirable microorganisms and enzymes while producing minimum changes in other food constituents. Microorganisms and enzymes can be inactivated by direct hits from radiations as well as by indirect effects. Therefore attempts to minimize changes in food during irradiation have been focussed on limiting indirect effects.

• **Limiting indirect effects:** Efforts to limit the indirect effects of radiations have been largely directed at minimizing free radical formation from water and reaction of free radicals with food constituents.

• **Irradiation in the fozen state:** Free radicals are produced even in frozen water, though possibly to a lesser extent. The frozen state also hinders free radical diffusion and migration to food constituents beyond the site of free radical production. Thus freezing can limit undesirable reactions.

• **Irradiation in vacuum or under inert atmosphere:** Removal of oxygen and minimization of these reactions also has a protective effect on food microorganisms, limiting the benefits that can be obtained.

Determining factors: The purpose of irradiation is food preservation, the choice of dosage must take into account several factors. They are:

- Safety and wholesomeness of the treated food
- Resistance of the food
- Resistance of microorganisms
- Resistance of food enzymes
- Cost

Importance of Irradiation:

Irradiation at the appropriate doses used for various technological objectives does not change the flavour, taste, smell, texture and mineral contents of foods. But enzymes do not get inactivated and pulses sprout after irradiation and irradiated fruits go through the natural ripening and maturation. Large amount of radiation is required to inactivate the enzymes and the food may become completely unacceptable. To inactivate the enzymes, prior heat treatment is necessary.

Carbohydrates, lipids, proteins and amino acids undergo minimal changes as a result of irradiation. Thiamine, pyridoxine and vitamin C are most susceptible than riboflavin, niacin or vitamin B12. At the low dose levels used in fruits, vegetables and grains the losses are in the range of 10 to 15 percent. Vitamin A,D,E,K are stable in low dose irradiated foods. In mangoes and papayas the provitamin A carotenoids are synthesised normally as the fruit ripens.

Clostridium botulinum appears to be the most radiation resistant organism.

Irradiated foods are safe and wholesome for human consumption. Food irradiation reduces post harvest storage losses. The producer, processor and consumer can all benefit from this technology in terms of improved storage, hygiene and retention of fresh quality.

In 1980, the Joint FAO/WHO Expert Committee after scrutinizing carefully all facts and studies pertaining to the wholesomes of irradiated foods declared that any food irradiated upto dose of 1 mega rad is safe for human consumption and such food need not undergo any toxicity testing.

Rad: It is the quantity of radiation which results in absorption of 100 ergs/g at the point of application.

The doses that are necessary to extend the storage life of most perishable foods are well below this permitted level. Food commodities and permitted limits of irradiation as given by PFA Act is presented in Table 7.1.

Table 7.1: Food Items and Permitted Limits of Radiation*

Food items	Purpose	Dose (kgy)
Onions	To inhibit sprouting	0.06
Potatoes	To inhibit sprouting	0.10
Frozen sea foods	To reduce the number of certain pathogenic microorganisms such as Salmonella in packaged frozen sea foods	5.00
Spices	To control insect infestation, to reduce microbial load and pathogenic microorganisms	10.00
Rice	To control insect infestation	0.62
Semolina (sooji or rava) Wheat atta and maida	To control insect infestation	0.62
Mango	To improve shelf life	0.50
Raisins and dried dates	To control insect infestation	0.50
Ginger, garlic and shallots (small onions)	To inhibit sprouting	0.09
Meat and meat products (including chicken)	To reduce the number of spoilage microorganisms and certain pathogenic microorganisms and parasites	3.25

* The Atomic Energy (Control of Irradiation of Food) Rules, 1996.

Controlling and Measuring Radiation:

There are many similarities between radiation and heat preservation. Like heat, radiation is capable of destroying microorganisms and inactivating many food enzymes, but they also can damage food constituents and so radiation dose must be carefully controlled. As with heat it is not just the intensity of the radiation source that is important but the amount of radiation that the food, absorbs thus processing time is important. Radiation energy must be provided in such a manner that it reaches every particle of food within the mass or container. In the case of heat preservation, conduction and natural convection help to distirbute heat throughout the container. In the case of cold sterilization by irradiation with the exception of limited diffusion of free radicals (indirect effect) these processes do not occur. An adequate killing dose must be obtained by uniformly irradiating throughout the entire mass.

Safety and wholesomeness of Irradiated foods:

Several International groups have studied the safety of food irradiation. In addition to safety from a microbiological standpoint these studies have been concerned with

- Effects of irradiation treatments on the nutritive value of foods
- Possible production of toxic substances from irradiation
- Possible production of carcinogenic substances in irradiated foods
- Possible production of harmful radioactivity in irradiated foods

These studies have uniformly concluded that irradiation does not result in an unsafe product, particularly at the lower doses now being considered for pasteurization, insect control and sprout inhibition.

Future for Food Irradiation: The use of irradiation for food, in the United States must be specifically approved by the Food and Drug Administration (FDA) on food by food basis. No current approvals are in effect for food sterilization but the FDA has approved several low-dose applications. Irradiation of potatoes would be a specific example. FDA not only indicates which foods can be irradiated but also sets the amount of radiation that can be applied. How important food irradiation, is difficult to assess. That will depend upon the future policies of FDA and similar agencies related to safety and approval of specific foods so processed. The improved keeping qualities and microbiological safety of irradiated foods could play a substantial role in international food exports and imports.

To this end international meetings have been held to consider the problems of drafting uniform guidelines and legislation pertaining to traffic in irradiated foods. These meetings have concluded that there is no toxicological hazard resulting from irradiating foods with a dose of upto 1 Mrad. This level of irradiation would help to control several pathogens and extend the storage life of many foods. However it is doubtful that irradiation will become commonly used for producing shelf-stable commercially sterile foods in the near future.

Microwave heating: Unlike ionizing radiations, microwave energy in food applications is used for its heating purpose. Microwave energy is similar to the energy that carries

radio and television programmes and to the energy involved with radar.

Properties of Microwaves: They include

- Microwaves are electro magnetic waves of radiant energy
- Microwaves like light travel in straight lines
- They are reflected by metals and pass through air
- Absorbed by several food constituents including water
- When they are reflected or pass through a material without absorption, they do not impart heat to the object
- To the extent that they are absorbed, they heat the absorbing material

Mechanisam of Microwave Heating: Common Alternating electric current reverses its direction 60 times a second. Microwaves do the same but at frequencies corresponding to 915 or 2450 MHz. When microwaves pass into foods, water molecules and other polar molecules tend to align themselves with the electric field. Although microwaves generate heat within the food, components with different loss factors do not immediately heat up equally. However as heat is generated, it is also conducted between food components tending to equalise temperature. In liquid foods the heat also is moved by convection.

Differences from Conventional Heating:

Conventional heating: Employing a direct flame, heated air, infrared elements, direct contact with a hot plate and soon the heat sources cause food molecules to react largely from the surface inward, so that successive layers heat in turn. This produces a temperature gradient which can burn the outside of a piece of food long before the temperature within has risen appreciably. So steak can be crusted on the outside but still be rare on the inside.

Microwave heating: Microwaves penetrate food pieces up to several centimeters of thickness uniformly, setting all water molecules and other polar molecules in motion at the same time. Heat is generated quickly and quite uniformly throughout the mass. The result is an internal boiling away of moisture. The steam also heats adjacent food solids by conduction. There is virtually no surface browning or crusting from excessive surface heat. Low thermal gradient microwave heating leads itself to numerous special applications.

Microwave generators and equipment: The most commonly used type of microwave generator is an electronic device called a magnetron. A magnetron is a kind of electron tube within a magnetic field which propagates high frequency radiant energy. The power output of different size magnetrons is rated in kilowatts. A larger magnetron or several smaller ones working together will heat a given quantity of food to a given temperature in a short time than a smaller one. Microwave energy heats only objects into which it is asorbed, there is relationship between food load and heating time to a given temperature. Thus 2 kg of water will take essentially twice the time to come to a boil as will 1 kg of water. It is also possible to heat liquid materials continuously with microwaves.

Microwave cooking: This appliance has relatively new meaning for the urban home maker. In microwave heating non-ionizing electromagnetic wave vibrating at microwave

frequencies create temperature rises when absorbed by certain materials.

Vitamins: About 83 to 91% vitamin B_6 is retained in meats. About 52 to 91% vitamin B_1, 73 to 98% vitamin B_2 and 64 to 100% vitamin B_3 is retained in various meat products, 48 to 98% of ascorbic acid is retained in vegetables. On the whole, microwave cooking results in higher vitamin retention in foods than those conventionally cooked.

Proteins: The protein content and the aminoacid content of foods cooked in microwave is not significantly affected.

Minerals: Conventionally cooked food has a significantly higher mineral content, especially phosphorus and iron.

Microwave Oven

Microwave food application: The current and potential uses of microwave heating in the food industry are many and are of growing importance. The following industrial applications are listed below:

1. Baking: Internal heating quickly achieves desired final temperature throughout the product. Microwaves can be combined with external heating by air or infrared to obtain crust.

2. Concentrating: Permits concentration of heat sensitive solutions and slurries at relatively low temperatures in relatively short time.

3. Cooking: Microwaves cook relatively large pieces without high temperature gradients between surface and interior. Well suited for continuous cooking of meals for large volume institutional feeding.

4. Curing: Meat can be cured without direct heat using microwave.

5. Drying: Microwaves selectively heat water with little direct heating of most solids. Drying is uniform throughout the product, pre-existing moisture gradients are evened out. Drying is at relatively low temperature. No part of the product need to be hotter than the vaporizing temperature.

6. Enzyme Inactivation (Blanching): Rapid uniform heating to the inactivating temperature can control and terminate enzymatic reactions. Microwaves are especially adoptable to blanching of fruits and vegetables without leaching losses associated with hot water or steam. Also does not overcook the outside before all enzymes are inactivated.

7. Final Drying: When most of the water has been removed by conventional heating methods, microwaves remove the last traces of moisture from the interior of the product quickly and without overheating the already dried material.

8. Freeze-drying: The ability of microwave energy to selectively heat ice crystals in matter makes it attractive for accelerating the final stages of freeze-drying.

9. Heating: Almost any heat transfer problem can be benefitted from the use of microwaves because of their ability to heat in depth without high temperature gradients.

10. Pasteurising: Microwaves heat a product very rapidly and uniformly without the over heating associated with external high temperature heating methods.

11. Pre-cooking: Microwaves are well suited for pre cooking “heat and serve” items because there is no overcooking of the surface and cooking losses can be negligible.

12. Puffing and Foaming: Rapid internal heating by microwaves causes puffing or foaming when the rate of heat transfer is made greater than the rate of vapour transfer out of the product interior. May be applied to puffing of snack foods and other materials.

13. Solvent Removal: Many solvents other than water are efficiently vaporized by microwaves, permitting solvent removal at relatively low temperatures.

14. Sterilizing: When adequate temperature may be reached (acid foods) quick, uniform come-up time may permit high temperature - short time sterilisation. Selective heating of moisture - containing micro organisms make possible the sterilization of such material as glass and plastic films which are not themselves heated appreciably by microwaves. This application must be considered continuously since escaping steam temperatures generally are not sufficient to kill bacterial spores.

15. Tempering: Because of the microwave heating effect is roughly proportional to moisture content, microwaves can equalize the moisture in a product that come from a process in a non-uniform conditions.

It must be recognised that several of the above applications may be achieved by other heating methods or combination processes. The choice of method must then depend on relative product quality and cost.

7.2. Use of High Concentration of Sugar - Fruit Preserve, Jam, Jelly and Marmalade Preparation, Importance of Pectin

Fruits and vegetables are an important group of protective foods. They are indispensable for maintaining good health and a proper condition of nutrition. The usefulness of fresh fruits is limited, by the fact that after maturing and ripening these cannot be kept in a good condition for a very long period of time. The tissues soon breakdown physiologically, the fruits begin to turn brown and loosing firmness due to loss of moisture by evaporation. Their taste is affected besides their appearance considerably. In order to make them available throughout the year and everywhere they can be preserved in different ways.

Jams, jellies and marmalades are excellent ways of utilizing surplus fruits. Not only fruit but even their peels can be preserved. This method still finds wide application in fruit preservation in spite of modern methods like canning and freezing because it is simple and economical. The method is based on the formation of gel by the pectin present in fruit in the presence of proper proportions of acids and sugar when heated.

Jam: The fruit tissues are held in position by the gel

Jelly: The clear fruit juice is set to a gel

Marmalade: It is a fruit jelly in which slices or peels of the fruits are suspended.

Jam: It is prepared by boiling the fruit pulp with sufficient quantity of sugar to a reasonably thick consistency firm enough to hold fruit tissues in position.

Preparation of jams: The riped fruits are selected and thoroughly washed to remove dust and dirt. The fruits are chopped, mashed or diced depending upon the nature of fruit and the type of jam required. If the fruit has little or no juice of its own a small quantity of water is added. Then the proper quantity of sugar (sucrose) is added. The finished product should contain 30-50 percent of invert sugar to avoid the crystallization of cane sugar in the jam during storage. If the fruit is deficient in acid and pectin, commercial preparations are added before the addition of sugar. Then the mixture immediately heated with constant stirring when done, it is packed in jars or cans. When packed in cans, the sealed cans are pasteurized for about 30 minutes.

During jam boiling all micro-organisms are destroyed within the products and if it is filled, while still hot into clean receptacles which are subsequently sealed and then inverted so that the hot jams contact the lid surface. This is done so that spoilage by microorganisms will not takes place during storage. About 30% of the vitamin C present in fresh fruit is destroyed during the jam-making process but that which remains in the finished product is stable during storage. The high moisture content of jam makes it susceptible to mould damage once the receptacles have been opened and exposed to air.

Precautions in jam making: Following points must be considered for getting good results.

- Pectin present in the fruit gives it a good set.
- High concentration of sugar facilitates preservation
- Over-ripe fruit should not be used as it produces pasty product
- In cases where the fruit is deficient in pectin, pectin from other fruits or solid pectin

may be used.

- If sugar is excess, jam becomes sticky and gummy.

  Therefore add pectin or acid or both to counteract the effects of excess sugar.

- If sugar is less add sugar

Determinination by sheeting or laddle test on jam making

There are two types of test namely:

1. Cold plate test: A drop of the boiling juice from the pan is placed on a plate containing water and allowed to cool. If the jam is about to set, the mixture on the plate will wrinkle when pushed with a finger. The main drawback in this method is that, while the drop on the plate is cooling, the jam mixture continues to boil in the pan, with the result that there is risk of over cooking the product or of missing the correct setting point.

2. Sheet or flake or ladle test: This method is more reliable than the plate test. In this test a small portion of the jam is taken with a large spoon or wooden laddle, cooled slightly and then allowed to drop off. If the jam drops like a syrup, it requires further concentration but if it falls in the form of flake or sheet the end point has been reached. After some experience this test can be adopted as a routine measure in the boiling of jam.

Apple Jam Preparation

Ingredients:

Fruit (Peeled and cut)	- 1 kg
Sugar	- 1 kg
Citric acid	- 8-10g
Potassium metabisulphite	- 1g

Preparation:

- Peel and grate the apples
- Add little water and boil till soft
- Add sugar and cook on brisk heat, stir well to prevent scorching
- Remove when right consistency has been achieved
- Add preservatives, colours and essence
- Fill it in clean jars after cooling
- Seal lid with melted wax

Jelly: Jelly is prepared by boiling the fruit juice with or without addition of water straining the extract and mixing. The clear extract with sugar and boiling the mixture to a stage at which it will set to a clear gel. A perfect jel should be transparent, well set, but not too stiff and should have the original flavour of the fruit. It should be of attractive colour and keep its shape when removed from the mould.

In jelly preparation pectin is the most essential constituent. If the pectin content of the fruit is poor commercial pectin is to be added. Similarly if the acid content of the fruit is low it is necessary to add fruits rich in acids such as citric acid, tartaric or malic acids. The

mixture is then heated to boiling point and cooked to the jelly stage. It is then put into glass containers or in the cans same as in jam.

Properties of a good jelly:

- A good jelly should be transparent, well set, but not too stiff and should have the original flavour of the fruit.
- It should be attractive in colour and keep its shape when removed from the mold.
- When cut it should retain its shape and show a clear cut surface
- It should be tender enough to quiver but not flow.

Four essential constituents of jelly includes:

Pectin	: 1.0%
Sugar	: 60 to 65%
Fruit acid	: 1.0%
Water	: 33 to 38%

Theory of Jelly Formation: Jelly formation is due to the precipitation of pectin rather than its swelling. Only when the pectin, acid, sugar and water are in definite equilibrium range, the precipitation of pectin takes place.

The Rate of Precipitation: It is influenced by the following factors

1. Concentration of pectin in the solution
2. Constitution of pectin
3. Hydrogen ion concentration (pH) of the pectin solution (for good jelly preparation pH value should be 3.2)
4. Concentration of sugar in solution
5. Temperature of the mixture

Cooking of jelly: Cooking promotes cohesion of jelly components and also brings them to a setting state. The mixture should be concentrated as rapidly as possible to avoid destruction of pectin. To achieve this, only that quantity of juice should be handled which can be boiled down to the desired consistency in about 20 mintues. If jelly is cooked for prolonged periods it may become gummy and sticky and may deteriorate in colour and flavour.

The end point in boiling a jelly can be judged in the following way:

1. Determination by jel meter
2. By carrying out the sheet or laddle test
3. By weighing the boiling mixture

Laddle Test

Failure of jellies to set is due to

- Lack of acid or pectin
- Addition of too much sugar
- Cooking below the end point
- Slow cooking for a long time

Table 7.2 presents the differences between jam and jelly.

Table 7.2: Differences between Jam and Jelly

S.No.	Jam	Jelly
1.	The fruit tissues are used in jam preparation	Clear fruit juices are used in jelly preparation
2.	It is opaque	It is transparent
3.	When cut at the edges, shape changes	It retains its shape when cut
4.	It is colloidal in nature	Jelly is too stiff
5.	When removed from the mould changes its shape	Keep its shape when removed from the mould
6.	It should not be cooled	It should be cooled
7.	Sugar is added according to the fruit pulp	Sugar is added according to the pectin content
8.	It can be prepared from any kind of fruit	Only pectin rich fruit can be used
9.	Preservatives are added	No preservative is added
10.	It is prepared by extracting fruit pulp	Jelly can also be prepared by adding jelly crystals artificially
11.	Fruits and vegetables can be used to prepare jam	Aqueous fruit is used for making jellies
12.	Equal amount of fruit pulp and sugar is added	Fruit extract and sugar is in the ratio of 1:0.5
13.	Jam is sticky	Jelly is non-sticky

Jelly Preparation: Guava Jelly

Ingredients Needed:

Fruit juice	-	1 litre
Sugar	-	500 g
Essence	-	¼ tsp.
Citric acid	-	¼ tsp.
Preservative	-	¼ tsp.

Preparation:

- Guava is rich in pectin content
- Ripe guavas with plenty of pulp are used. Wash the fruits and cut into thin slices
- Add water to cover the surface then boil
- Do not stir the contents when it is boiling because Jelly formation will be delayed
- Strain the fruit juice
- Then add sugar and citric acid and boil again
- Add essence and preservatives when it is fully boiled and test for an end point
- Cool it after putting in jelly moulds
- Finished jelly is stored in sterilized containers

Marmalades: It is a fruit jelly in which the slices of the fruit or peel are suspended. The term marmalade is generally associated with the product made from citrus fruits like oranges and lemons in which shredded peel is included as the suspended materials.

Marmalade is a sugar preserve. It is defined as semisolid or gel like product prepared from fruit ingredients together with one or more sweetening ingredients and may contain suitable food acids and pectins. The ingredients are concentrated by cooking to such point that the Total Soluble Solids (TSS) of the finished marmalade is not below 65%.

Preparation of Marmalades: In the preperation of marmalades all the conditions necessary for jelly making are applicable. The pectin and acid contents of the marmalades should be kept slightly higher than what has been recommended for jellies. Citrus marmalades are of two kinds, namely,

- Jelly marmalade
- Jam marmalade

Jelly Marmalade: A good citrus jelly marmalade can be made by the following methods:

- It is prepared from citrus fruits
- Peel the fruits and smash the fruit and add ¼ amount of water and boil for 45 to 60 min.
- Wash and cut the peel and add ammonia or sodium

carbonate and boil it.

- After testing the pectin content with jel meter boil the fruit juice and add sugar and the cooked peel of the fruit. Boil it for 20 minute upto 218^0F till it gets jelly consistency.
- Once the marmalade is ready, pour it into a vessel or container. Stir it well and add orange essense.

General Procedure for the Preparation of commercial Jams, Jellies and Marmalades

- Boil the pulp or juice (with water when necessary)
- While the pulp or juice is boiling mix 25g pectin with 100g of sugar in one litre of water
- Add the sugar - pectin mix and boil while stirring very vigorously.
- Boil the mixture for about 2 minutes. to ensure that sugar pectin mix has completely dissolved.
- Add the sugar while keeping the mass boiling
- Boil down quickly to desired Brix
- Add the acid usually citric acid and remove the froth
- Fill hot jam or jelly into sterilized jars and close
- Invert the jars for 3 minutes to pasteurize and cover

Importance of Pectin: Pectin is a chemical substance belonging to the carbohydrate group generally found in fruit and vegetable tissues. It is soluble in water and forms a gel when combined in a particular proportion with sugar and acid. In unripe fruits pectin occurs as pectose or protopectin and as pectic acid in over ripe frutis. Only pectin possesses the properties of setting a jelly. In cooking, pectin is used as a thickening agent and could be considered one of the most natural types around. Pectin is extracted and available in powdered form (commercial jelly) mixed with gelatine, sugar, essence and preservatives.

It does not add flavour to the dishes and it does work extremely well as a thickening agent. This complex carbohydrate is also used in a variety of commercially prepared foods to bind these foods together more effectively. For example yogurt, chocolate, milk. At molecular level pectin is a strong binding agent which directly relates to its tremendous detoxification and cholesterol lowering properties.

Important sources of pectin: Some of the important sources of pectin are as follows:

i. Pectin from apple pulp

ii. Citrus pectin

iii. Jack fruit residue and unripe papaya are fairly good sources of pectin.

Pectin from apples: Apples are washed with dilute hydrochloric acid to remove any spray residues. They are crushed or grated and then pressed. The pomace is dried quickly to avoid fermentation. It is dried at 66^0 to 82^0C in revolving drums on rotatory driers to 6 to 8 per cent moisture content. About 45.3kg of dry pomace are got from a tonne of apples.

The dried pomace is leached with cold water to remove colouring and flavouring material and also sugars if any. The leaching can be carried out conveniently in a tank fitted with a perforated false bottom and an outlet.

Citrus pectin: It is a plant pectin obtained from the rind and peel of citrus fruits such as lemons, grape fruits and oranges. Citrus pectin is very much bioavailable and has a galactose rich make up giving the ability to deliver the following extraordinary benefits:

- Removes heavy metals and toxins
- Promotes cardiovascular health
- Promotes normal cell growth

Citrus pectin has cholesterol lowering effect in animals and humans. Citrus pectin supplementation significantly decreases blood cholesterol levels without altering patients diet or lifestyle. Extensive research by Texas University's Agricultural Centre has shown that citrus pectin may prevent prostate cancer. Citrus pectin has the additional effect of blocking angiogenesis which results in the cancer cells being starved to death.

Pectin from other materials: Pectin of good quality can also be prepared from green papaya, jack fruit rind, guava etc. Useful research work on these materials has been conducted at CFTRI, Mysore.

Grading Methods: Pectin is standardized for jelly grade either by chemical methods or actual jelly boiling trials.

Chemical method: Pectin is estimated as calcium pectate. This alone does not give the true value for the jelly strength of pectin, as purified pectins may vary in composition.

Testing the pectin content of cooked fruit juice

Alcohol Test: This is the simplest test available. In a cup stir together 1 tea spoon cooked fruit juice with three tea spoon methyl alcohol . No extra pectin is needed if the juice forms one big mass that can be picked up with a fork. If the fruit juice is too low in pectin it will make several small clots that do not club together. Add 1 tablespoon liquid pectin for each cup of juice to increase the foam.

Uses of Pectin:

- Used as thickening agent in the preparation of ketchups, sauces, jams etc.
- Used as an emulsifying agent in the preparation of products like cod liver oil, ice cream etc.
- It increases the foaming power of gases in water and to glace candid fruit
- Powder pectin does go into solution easily. It has a tendency to form lumps in jam making.
- Apple pectin in liquid form and citrus pectin in powder form are important commercial products since the powder pectin has a high jelly grade.

7.3. Fruit Juices - Types, Methods of Preparation, Chemical Preservatives

Fruit Juices: In India, cold drinks are in demand practically throughout the year. Among these, fruit juices have an important place. Being rich in essential minerals, vitamins and other nutritive factors, they are quite popular. Besides they are delicious and have universal appeal unlike other beverages.

The nutritive value of real fruit beverages is far greater than that of synthetic products which are at present being bottled and sold in large quantities throughout the country. The anuual production of carbonated beverages like lemonade, strawberry, lime juice as well as various kinds of "sherbet" and other artificially flavoured beverages run into several million bottles. If real fruit juices could be substituted for these synthetic preparations, it would be a boon to the consumer for the production of fruit juices and other fruit based beverages.

Till about 20 years ago, only grape and apple juices were produced there in any considerable quantity. In those days, these juices were used almost exclusively for medicinal purposes and were generally recommended by doctors for infants and invalids. Nowadays, however on account of the common use of fruit juices as breakfast foods, a large variety of them is produced on a big scale from fruits such as orange, pineapple, apple and grape. Small quantities of juices are produced from sour lime, lemon, cherry, blackberry, apricot, peach, plum, pomegranate, papaya, pear etc. Several of these tart juices are largely used for preparing mixed drinks and in bakery products. They are now becoming more popular than the carbonated beverages from apples and grapes.

Fruit juices, especially orange, apple and grape juices are concentrated using modern equipment so that there is practically very little loss in their nutritional properties and flavour characteristics. These concentrates are used as basis for soft drinks, pharmaceutical preparations, baby foods and tonic foods.

Steps in fruit juice preparation

Main steps in the production of most types of juices are extraction of the juice, clarification of the juice, juice deaeration, pasteurisation, concentration (if solids are to be increased), essence add-back, canning or bottling and freezing if the juice is to be marketed in this form.

Fruit Juice Extraction

Juice extractors for oranges and grape fruit, whose peels contain bitter oils are designed to cause the peel oil to rundown the outside of the fruit and not enter the juice stream. Because bitter peel oil is not a problem in the case of apples, the whole apple is pressed after grinding. This is repeated for many fruits.

Clarification

The juice pressed from most fruits contains small quantities of suspended pulp, which is often removed. This may be done with fine filters, but since these have a tendency to clog, it is common to use high-speed centrifuges, which separate the juice from the pulp according to their difference in density.

Many people prefer crystal clear apple juice. However, simple filtration of centrifugation may leave minute particles of pulp and colloidal materials suspended in the juice by the natural pectic substances of the fruit. Addition of commercial enzyme preparations that digest pectin substances causes the fine pulp to settle, which makes filtering or centrifuging more effective and produces clarified apple juice. Orange juice on the other hand, is more acceptable if it retains a slight cloud of suspended pulp and so that it is not removed.

Deaeration

Orange and other juices contain entrapped air and are deaerated by being sprayed into a vacum deaerator. This minimises subsequent destruction of vitamin C and other changes due to oxygen.

Additional steps

- Generally fruit juices are pasteurised to decrease microbial growth and to inactivate natural enzymes.
- All natural juices are low in solids and so it is common to concentrate many of them whether they are to be frozen or not. When this is done, low-temperature vacum evaporation generally is employed to retain maximum flavour.
- Various methods of concentrating juices including pumping them through reverse osmosis membranes are currently being studied.
- Pulp can then be added back to the concentrated juice. The juice concentrate may then be frozen, or it may be shipped for subsequent reconstitution and packaging as single strength juice.
- In recent years, it has become popular to blend different juice types together to form new beverages. Mango may be blended with apple and cranberry or citrus juices with raspberry. Pear juice is a popular base for many juices because it has a strong fruit flavour.
- Many juices and juice blends are rich in vitamin C. Apple juice, which is normally low in vitamin C may be fortified with this vitamin. There is increasing demand for high quality juice as a nutritious beverage and much is now being aseptically packaged in paper cartons of individual serving size.
- Whenever fruit is processed or juice produced, there remain peels, pits and other non-juice solids. Some of this finds its way into confectionery and jelly products, pectin manufacture, recovery of chemicals and animal feeds.

Types of Fruit Beverages

Fruit juices are preserved in different forms such as pure juices, squashes, cordials and pure fermented juices. These are broadly defined as follows:

Unfermented juice or pure fruit juice: This is the natural juice pressed out of the fruit and remains practically unaltered in its composition during preparation and preservation.

Fruit juice beverage: This is a fruit juice which is considerably altered in composition before consumption. It may be diluted before it is served as a drink.

Fermented fruit beverage: This is a fruit beverage which has undergone alcohol fermentation by yeast. The product contains varying amounts of alcohol. Grape wines, apple ciders, berry wines etc. are typical examples of this kind of beverage.

Fruit juice squash: This consists essentially of strained juice containing moderate quantities of fruit pulp to which cane sugar is added for sweetening. (eg): Orange squash, pineapple squash, mango squash.

Fruit juice cordial: This is a sparkling, clear sweetened fruit juice from which all the pulp and other suspended materials have been completely eliminated. (eg). Lime juice cordial.

Sherbet or syrup: This is a clear sugar syrup which has been artificially flavoured. Eg. Sherbets of sandal, sangtra, almond rose, khuskhus, etc.

Fruit juice concentrate: This is a fruit juice which has been concentrated by the removal of water either by heat or by freezing. Carbonated beverages and other products are made from this.

Fruit juice powder: This fruit juice which has been converted into a free-flowing, highly hygroscopic powder to which natural fruit flavour in powder form is incorporated to compensate for any loss of flavour in concentration and dehydration. They are reconstituted readily to yield full strength, full fruit, juice drinks.

Fruit juices have their best taste, aroma and colour when they are freshly extracted. All subsequent efforts to preserve them adversely affect their quality to varying degrees, depending upon the method of preservation employed.

Preservation of Fruit Juices

Freshly extracted juices are highly attractive in appearance and possess good taste and aroma, but deteriorate rapidly, if kept for some time. This is on account of several causes as shown below:

- Fermentation may be caused by mould, yeast and bacteria.
- Enzymes present in the juice may affect the colour and flavour adversely. For example, apple juice turns brown due to the activity of oxidative enzymes present in it.
- Chemicals present in the juice may react with one another and spoil the taste and aroma of the juice.
- Air coming in contact with the juice, may react with the glucosidal material in the juice and render the juice bitter thus the juices from naval orange and sweet lime often turn bitter when they are exposed to air even for a short time.
- Metals from the equipment may get into the juice and spoil the taste and aroma

To retain the natural taste and aroma of the juice, it is necessary to preserve it soon after extraction, without allowing it to stand for any length of time. Various methods of preservation are employed and each has its own merits.

The methods generally used are:

i. Pasteurization
ii. Addition of chemicals
iii. Addition of sugar
iv. Freezing
v. Drying
vi. Filtration

Squashes and Cordials

Fruit juices are most commonly preserved as squashes or cordials in this country, although canned pure fruit juices like orange and pineapple juices and quite recently mango juice are gaining importance.

Preparation of Orange Squash

Extraction of juice

- Tight skinned oranges are cut into halves and pressed by hand against a revolving burr or rose fitted to a rosing machine.
- The extracted juice is collected in a vessel. It contains plenty of coarse tissues, seeds etc. To remove these, it is filtered through a net cloth or on a sieving machine
- The sieved juice is utilized for making squash.

Preparation of Squash

- Sugar, citric acid, flavouring materials, colour and preservatives are added to the juice in correct proportion
- Sugar, citric acid and water are mixed and heated. Any dirt is skimmed off. The syrup is cooled slightly and filtered through cloth.
- The clean syrup is blended with the juice. To improve flavour, orange essence is added to the squash.
- The colour of the squash is improved to satisfy consumer demand, by adding on edible colour like sunset yellow in suitable proportions.
- After mixing all the ingredients, a calculated amount of a chemical preservative, namely potassium meta bisulphite in a small quantity of the juice or water, is added to the squash.
- The bottles are cleaned and washed in a bottle washing machine. The sterile bottles are rinsed with hot water before filling them with the squash, leaving about 1.2 to 2.5 cm of head space.
- The bottles are then closed with crown corks or pilfer proof closures.
- The labelled bottles are stored in a cool dry place. The products keep well for one to 1½ year without much change in colour, taste and flavour.

  In the same way with little variation lemon, grape, pineapple, mango and lime squashes are prepared.

Carbonated Beverages

Use of fruit juices in the preparation of carbonated beverages was practically negligible till very recently, although large quantities of aerated waters, iced sherbets and synthetic drinks containing sweetening agents like saccharin are consumed all over the country. These products have practically very little or no nutritive value. If real fruit juices are popularised instead, the nutritive value of these beverages could be increased considerably.

Juices can be carbonated directly, or they can be stored as such or in the form of concentrates for subsequent carbonation whenever necessary.

Chemical Preservatives:

A preservative is defined as any substance which is capable of inhibiting, retaining or arresting the growth of microorganisms or of any deterioration of food due to microorganisms. The inhibition of the growth and activity of microorganisms is one of the main purposes of the use of chemical preservatives.

It is estimated that nearly 1/5 of the world's food is lost by microbial spoilage. Chemical preservatives interfer with cell membrane of microorganisms, their enzymes or their genetic mechanisms. The compound used as preservatives include natural preservatives such as sugar, salt, acids as well as synthetic preservatives. Chemical preservatives are generally added after the foods are processed.

Ideally, a chemical preservative should have a wide range of activity and should not be inactivated by the food or any substance present in the food. It should not aid or encourage the development of resistant strains and should kill rather than inhibit the microorganisms. At the same time it should be non-toxic to human beings or animals, economical with no effect on the flavour, taste or aroma of the original food. So far, such an ideal preservative has not been found. Most of the preservatives are inhibitory at acceptable concentrations. Many food products need to remain stable for some time after the package has been opened (eg) Jam and ketchup and therefore they need the preservative to be present in the food itself.

The antimicrobial preservatives may be classified into two broad categories as

i. Naturally occurring preservatives such as organic acids (lactic, malic and citric acids and their salts), vinegar (acetic acid), sodium chloride, sugars, spices and their oils, carbon-di-oxide and nitrogen.
ii. Substances generally recognised as safe for addition to foods such as propionic and its sodium and calcium salts, sodium and calcium sorbates, benzoic acid and benzoates and derivatives of benzoic acid, sulphur dioxide and sulphites, potassium and sodium metabisulphite and sodium nitrite.

Organic acids and their salts

- Lactic, acetic, propionic and citric acids and their salts may be added to or developed in foods during fermentation. Citric acid is used in syrups, drinks and jellies as a substitute for fruit flavours and for preservation.

- Sodium propionate and calcium propionate are used most extensively for the prevention of mold growth and rope inhibition in bread and other baked goods and for mold inhibition in many cheese products and spreads.
- Sodium benzoate have been incorporated in jams, jellies, margarine, carbonated beverages, fruit salads, pickles and fruit juices as an antimicrobial agent.
- Sorbic acid salts of calcium, sodium and potassium are used directly in foods and as spray or dip coating on packaging materials. They are used in cheese, cheese products, baked goods, beverages, syrups, fruit juices and pickles.
- Acetic acid in the form of vinegar is used in mayonnaise, pickles and pickled sausages. It is more effective against yeast and bacteria than against molds. Sodium diacetate has been used in cheese spreads, ketchup, mayonnaise, acid-pickled vegetables and bread.

Other organic chemicals

- Sugars, such as glucose or sucrose function as preservatives because of their ability to lower the water activity, by tying up water molecules and providing osmotic effect. Foods preserved by high sugar concentrations include sweetened condensed milk, fruits in syrups, jellies and candies.
- Nitrates and nitrite compounds are used to preserve meats, give them desirable colour and flavour, discourage growth of microorganisms and prevent toxin formation.
- Sodium nitrite has been used for centuries as a preservative and colour stabilizer in meat and fish products. The nitrite curing, inhibits the growth of clostridium and streptococcus and also lowers the temperature required to kill C.botulinum.
- Chlorine and hypochlorites of calcium and sodium are used for treatment of drinking and process water and for cleaning the processing equipment.
- Monosodium glutamate (MSG) has a pleasant salty-sweet taste and a property often described as “mouth satisifaction”. It promotes sensory perception of meat-like aroma and used as additive in frozen, dehydrated or canned fish or meat products.

Preserved Fruit Juices

7.4. Food Fortification and Enrichment - Need, Fortified and Enriched Foods

Food fortification

Several terms besides fortification are used for the addition of nutrients to foods: restoration, enrichment, standardisation and supplementation.

Restoration: Restoration is the addition of a nutrient to a food in order to restore the original nutrient content.

Enrichment: It is the addition of nutrients to foods in accordance with a standard of identity as defined by food regulations. Both restoration and enrichment programmes usually involve the addition of nutrients that are naturally available or present in the food product.

Standardization: It is the process of developing a standard quality product by repeated trials. Standardization is an important step to ensure a consistent standardized quality of the final product.

Supplementation: It is the addition of nutrients that are normally present or present in only minute quantities. More than one nutrient may be added and they may be added in high quantities.

As compared with restoration and standardization, fortification has a special meaning - the nutrients added and the food chosen as a carrier have met certain criteria, so that the fortified product will become a good source of the nutrient for a targeted population. Nutrients added for food fortification may or may not have been present in the food carrier originally.

Need

Food fortification is the public health policy of adding micronutrients (essential trace elements and vitamins) to food stuffs to ensure that minimum dietary requirements are met. Simple diets based on staple foods with little variation are often deficient in certain nutrients, either because they are not present in sufficient amounts in the soil of a region or because of the inherant inadequacy of the diet. Addition of micronutrients to staples and condiments can prevent large deficiency in these cases.

Many physicians today disagree with the idea that foodstuffs need supplementation, but accept that, added calcium may provide benefit, or that adding folic acid may correct a nutritional deficiency especially in pregnant women.

Food enrichment

Enriched means that vitamins or minerals have been added to the food in addition to the levels that were originally found before it was refined. When foods are fortified, they will have more vitamins and minerals.

Examples of fortified foods

Iodine is added to salt. Folic acid is added to flour in many industrialized countries and has prevented a significant number of neural tube defects in infants. Niacin has been added to bread. Fluoride salts are added to water and toothpastes to prevent tooth decay. Calcium is frequently added to fruit juices, carbonated beverages and rice.

Objectives of food and fortification and enrichment

- To maintain the nutritional quality of foods, keeping nutrient levels adequate to correct or prevent specific nutritional deficiencies in the population at large or in groups at risk of certain deficiencies (ie the elderly, vegetarians, pregnant women etc).
- To increase the added nutritional value of a product
- To provide certain technological functions in food processing
- To solve the public health problems, such as salt iodization to prevent goitre.

Table 7.3 presents the commonly fortified foods.

Table 7.3: Fortified Foods with Fortifying Agents

S.No.	Foods	Fortifying agent
1.	Salt	Iodine, iron
2.	Flours, bread, rice	Vitamins B_1, B_2, Niacin, iron
3.	Milk, margarine	Vitamin A and D
4.	Sugar, monosodium glutamate, tea	Vitamin A
5.	Infant formula, cookies	Iron
6.	Vegetable mixtures, amino acids, protein	Vitamins, minerals
7.	Soy milk, orange juice	Calcium
8.	Ready to eat cereals	Vitamins, minerals
9.	Diet beverages	Vitamins and minerals
10.	Enteral and parenteral solutions	Vitamins and minerals

The addition of vitamins B_1, B_2, niacin, iron and calcium to wheat flour is a common practice in many developed countries. The fortification of powdered milk has been achieved by the addition of dry vitamin preparations to the milk powder as well as by vitamin addition to the liquid milk just prior to spray drying. Fortification of beverages with calcium has become a popular practice.

Orange peel is an easily digestible, highly nutritious support for a healthy digestive tract and has helped to ease out gastrointestinal complaints. The pectin in organic peel appears to stimulate the growth of healthy bacteria that is effective in helping to prevent food borne pathogens. Orange peel powder is added to biscuit dough and the results showed, peel incorporation had better texture, taste, flavour and aroma.

Questions

PART - A

I.A) Choose the Correct Answer

1. ____________ is used as a latest technology to extend the shelf life of food materials.
   a) Canning b) Food irradiation c) Fermentation
2. ____________ is the application of heat to foods rapidly with minimal destruction.
   a) Ohmic heating b) Microwave heating c) Direct heating
3. The electronic device used in a microwave generator is ____________
   a) Elect tube b) Magnetron c) Electric chamber
4. Fruit peels are used in ____________ preparation
   a) Jam b) Jelly c) Marmalade
5. In jelly preparation ____________ is used.
   a) Clear fruit juice b) Fruit tissues c) Peels of fruit
6. ____________ is used to find out the pectin quality of fruit juices
   a) Methyl alcohol b) Citric acid c) Sugar
7. The end point of jelly can be judged by using ____________
   a) Jel meter b) Hot plate test c) Cold plate test
8. A good jelly should be ____________
   a) Opaque b) Transparent c) Sticky
9. Apple cider is a ____________
   a) Fruit juice beverage b) Fermented fruit beverage c) Fruit juice cordial
10. ____________ is a sparkling, clear sweetened fruit juice
    a) Squash b) Cordial c) Syrup
11. Concentrated juices are in the form of ____________
    a) Powder b) Flakes c) Semisolid
12. ____________ is a chemical preservative used in syrups and jam preparation.
    a) Citric acid b) Tartaric acid c) Oxalic acid
13. ____________ has the property of mouth satisfaction
    a) Sodium nitrite b) Monosodium glutamate c) Sodium phosphate
14. Infant formulas are often fortified with ____________
    a) Iodine b) Iron c) Vitamin A
15. Equal amount of fruit pulp and sugar is added in ____________ preparation.
    a) Jam b) Jelly c) Candy

B) Answer in one or two sentences

1. Mention the permitted dose of radiation for meat preservation.
2. Expand FDA.
3. What is a magnetron?
4. What is a marmalade?
5. Mention the tests used in finding out the end point in jam preparation.
6. What is jelly?
7. How do you find out the end point of jelly?
8. Mention any two reasons for failure of jelly setting.
9. Define jam.
10. what is pectin?
11. Mention any two sources of pectin.
12. Mention the grading methods of pectin.
13. How juices are clarified?
14. Give examples for fermented fruit beverage.
15. What is a squash?
16. Give any two examples for naturally occurring preservatives.
17. Define a preservative.
18. Define food enrichment.
19. How beverages are fortified?
20. Mention the fortifying agent for bread.

PART - B

II. Answer in five lines

1. Mention the purposes of irradiation in food preservation.
2. What are the direct effects of radiation?
3. Define food irradiation.
4. Define ohmic heating.
5. Write a short note on microwave heating.
6. What are the precautions to be taken in jam making?
7. List the properties of a good jelly.
8. Write the factors influencing the rate of percipitation in gel formation.
9. Mention the theory of jelly formation.
10. What are the extraordinary benefits of using citrus pectin?
11. List the uses of pectin.

12. Mention the different types of fruit beverage.
13. Classify preservatives.
14. What is the difference between standardization and supplementation?
15. Write the objectives of food fortification.

PART - C

III. Answer should not exceed one page

1. Explain radiation effects
2. Write a short note on microwave cooking
3. Bring out the general procedures of preparing jams.
4. Differentiate a jam and a jelly.
5. Explain the steps in fruit juice preparation.
6. How do you preserve fruit juices?

PART - D

IV. Answer in Detail

1. Explain jelly under the following headings:
   a) Properties b) Essential constituents c) Cooking d) End point
2. Discuss on the role of pectin.
3. Write the procedure for preparing orange squash.
4. Explain chemical preservatives in detail.
5. Discuss about food fortification and enrichment.

8. BAKERY PRODUCTS

8.1. Cakes – Ingredients, Cake Making Methods

Baking is the technique of prolonged cooking of food by dry heat acting by convection, and not by radiation, normally in an oven. It is primarily used for the preparation of bread, cakes, pastries and pies, cookies and crackers. Such items are referred to as "baked goods" and are sold at a bakery. The dry heat of baking changes the form of starches in the food and causes its outer surfaces to brown, giving it an attractive appearance and taste, while partially sealing in the food's moisture. The browning is caused by caramelization of sugars and the maillard reaction. Some of the famous baked products like preparation of bread, biscuits and cookies are known already, the remaining products like cakes and pastries are discussed here elaborately.

Cakes: Cake is a form of food, typically a sweet, baked dessert. Cakes normally contain a combination of flour, sugar, eggs and butter or oil, with some varieties also requiring liquid (typically milk or water) and leavening agents such as yeast or baking powder. Flavourful ingredients like fruit purees, nuts or extracts are often added and numerous substitutions for the primary ingredients are possible. Cakes are often filled with fruit preserves or dessert sauces (like pastry cream), iced with butter cream or other icings, and decorated with marzipan, piped borders or candied fruit.

Cake is often the dessert of choice for meals at ceremonial occasions, particularly weddings, anniversaries, and birthdays. There are countless cake recipes. Some are bread like, some rich and elaborate and many are centuries old. Cake making is no longer a complicated procedure. Baking equipment and directions have been simplified that even the most amateur cook may bake a cake.

Cake Making Ingredients : Cake making ingredients are classified as:

1. Essential ingredients (Flour, sugar, shortening and eggs)
2. Optional ingredients (baking powder, milk, fruits, etc)

The above ingredients are also classified according to the function in which each ingredient performs in cake making. This classification is as follows:

1. Structure builders (flour, eggs, milk)
2. Tenderizers (Fat, sugar, baking powder)
3. Moisteners (milk, eggs)

Flour: Flour builds structure of the cake and holds other ingredients together in an evenly distributed condition in the cake. Flour for cake making should have a protein content of 7 to 9 percent and the flour should be soft. Cake-flour should have a fine granulation which has a beneficial effect on the fineness of the grain of cake. Cake-flours are bleached to a greater extent in order to brighten the colour of flour. Cake made from too strong flour will peak in the centre, be tough and dry-eating. In case of too weak flour, the cakes may flatten out or even sink in the centre. The following instruction may be used as a guide while selecting flour for making specific types of cakes.

- Medium type flour is used for making small queen-cakes and maderia cakes.
- Slab-cakes and pound cakes are made best with soft flour.
- For cherry-cake or heavily fruited cakes, medium flour should be used in order to prevent fruits from sinking and also to avoid crumbliness in cake.
- For rich cakes like wedding, Christmas or birthday cakes, a combination of medium and soft flour gives good results.

Sugar: Sucrose is the most commonly used sweetening agent in cake making. Due to its tenderizing action on flour proteins, it makes the cakes tender. Being hygroscopic in nature, sugar helps to retain moisture in cakes improving its shelf life. Sugar has a lubricating action on gluten strands and thus helps in the process of acquiring volume in cakes. The golden brown crust – colour of cakes is due to caramalization of sugar. Dextrose mono hydrate is used where it is desired to cut down the excessive sweetness of cakes. Normally dextrose is used only in part with sucrose and not as a total replacement of sucrose.

Whichever sugar is used in cake-baking, its granulation is very important. When fat and sugar is creamed together, small aircells are incorporated in the mix. Too large a grain of sugar will have a cutting action on fat which will prevent entrapping of air cells in the mix. Too fine a grain of sugar will also not produce desirable aeration. A coarsely powdered sugar is most suitable for cake making.

Liquid sugars (honey, molasses, invert sugar) can be used in part with powdered sugar. Liquid sugars (Invert sugar – when sucrose acts on acid or enzymes dextrose and levilose are released. These mix is called invert sugar) have better moisture – retention capacity and improve the shelf life of cake. Liquid sugars impart peculiar flavour and improve the crust colour of cakes.

Shortenings: Fats have a tenderizing effect on flour proteins and thus make the cakes tender. Shortening for cakes should have good creaming properties, a neutral flavour and odour. It is the fat part of the mixture which holds innumerable air-cells incorporated during creaming operation. These aircells have a tenderizing influence on cakes. As a moisture retainer, fat helps to keep the cakes moist, thus improving the shelf life of cakes.

Fats used in cake making should be plastic in nature which could incorporate and hold minute aircells during creaming operation. Granular fats do not fulfil this function and should be avoided. Fat should be able to maintain its plasticity within the temperature range of 60 to 85ºF. Too hard fats will not cream well while too soft fats will not be able to retain the aeration.

Butter is considered to be the best of all baking shortenings from a flavour standpoint. The creaming quality of butter is rather poor. Cakes made with butter are generally lower in volume and have a coarser grain than those made with a high quality shortening with good creaming characteristics. For this reason some bakers use part butter in formula for the flavour it contributes, and part shortening for increase in volume and finer grain. Use of emulsified type of shortenings makes it possible to add more water in the mixture, such cakes retain their moistness for a longer time.

Eggs: Most important function of eggs is to provide structure to cake. Although eggs by themselves do not act as an aerating agent, air incorporated during whipping of eggs perform this function. Eggs and flour form a skeleton which acts as supporting the frame work of a cake. Eggs provide moisture to the cakes. Lecithin present in the egg yolk acts as an emulsifier and lutein also found in yolk, imparts colour to cakes. Egg improves the taste, flavour as well as nutritional value of cakes. Eggs are good leaveners. Beating of the eggs is very important. They should be beaten so that they will hold a fairly good crease. This crease is made by running a palate knife through the beaten mass.

Milk: Milk solids perform the function of structure formation in cakes. Milk proteins have a binding action on flour proteins which may increase toughness and dryness in cakes. However, adequate quantities of fat, sugar and water present in the formula keep the cakes tender and moist. Milk enriches the cakes nutritionally. Lactose sugar present in milk improves the crust colour and moisture retention capacity of cakes. Milk also improves flavour and taste of cakes. Apart from eggs, milk is the only other ingredient providing moisture in the cakes.

Water: Water regulates the consistency of the batter. It also develops the protein in the flour which acts to retain the gas from the baking powder. Water, whether added as such or in the form of liquid milk, hydrates flour proteins (forming gluten) which builds up the structure of cakes. Formation of gluten (which resists expansion of cakes due to CO_2 gas), release of CO_2 gas from baking powder and formation of vapour pressure are made possible by the presence of water. These factors are important in regulating the volume of cake. Shelf life of cakes is determined by the amount of moisture retained in the cake after baking which eventualy depends upon the amount of water used in the formula.

Salt: Salt enhances the natural flavour of other ingredients used in cake making and thus improves the flavour of cakes. It also improves the crust colour of cakes by lowering caramalization temperature of sugar. Certain cakes contain excessive quantity of sugar either in the formula itself or in the form of icing. Salt helps to cut down the excessive sweetness of cakes. A pinch of salt always improves the taste and flavour of the products.

Leavening Agents

Leavening action in cakes is achieved by three means:

- By incorporation of air during mixing – mechanical aeration.
- By use of chemical leavening agents – chemical aeration.
- By vapour pressure created in the oven – vapour pressure.

Among the three different kinds of leavening actions, mechanical aeration is considered to be necessary.

Quantity of baking powder should be carefully regulated in the formula in order to achieve good results. Cakes baked as small units, should contain more baking powder in comparison with cakes baked as larger units. A large cake has to be baked at low temperature and for a longer time which allows it a slow, even and gradual rise resulting in a perfectly baked product.

Products containing more fat or more egg will have sufficient aeration either during creaming operation (fat and sugar or fat and flour) or during whipping of eggs. In both the cases, the quantity of baking powder should be suitably reduced in order to achieve perfect aeration.

Baking powders are of three different types:

1. Fast acting: This type of baking powder releases most of its CO_2 gas during mixing and very little gas is released during baking.
2. Slow acting: Such baking powders do not release much of gas during mixing and all the gas is released when it comes in contact with oven heat.
3. Double acting: This type of baking powder is most widely used by bakers.

This baking powder releases a part of gas during mixing operation, increasing the fluidity of the batter. This action makes the weighing operations easy enabling the baker to apportion the batter in different moulds correctly. The remaining CO_2 gas is released in the oven which imparts volume to cake.

Flavour: Flavour is a very important aspect of a quality product. Due to the variations in strength of flavour it is not possible to set any given amount to be used. It is much better to use a small amount of good flavour than to load up the cake with a poor flavour. Flavouring ingredients are of three basic types - spices, extracts and emulsions. The spices are granular powders of roots, seeds and blossoms of aromatic plants. Extracts are alcoholic solutions containing aromatic flavours. Emulsions are colloidal systems of volatile, essential oils dispersed with water and stabilized by gum plants. A flavouring material should always be measured or weighed carefully as even a slight excess of essence will not only be a wasteful practice but it will spoil the gastronomical appeal of the product.

Cake – Making Methods

The following methods can be used for cake making.

1. Sugar – batter method
2. Flour – batter method
3. Blending method
4. Boiled method
5. Sugar water method
6. All in one process method

However, by far the sugar batter and flour-batter methods are most widely used for making cakes of different types.

1. Sugar – Batter Method

- In this method, all the fat and an equal amount of sugar is creamed together. Shortenings used for cake making should be plastic in nature. Granular fats should be avoided which have poor capacity for holding aeration.

- Very often a combination of fats like hydrogenated shortening, butter, margarine is used in order to acquire specific characteristics in the cake. It is very necessary that all the shortenings are at room temperature ie 70 to 75°F.
- Shortenings used for cake making should not melt by the heat produced due to friction during the process of creaming.
- In practice, all the fats should be first creamed together (either in the machine or by hand) in order to blend them thoroughly.
- Then sugar is added gradually continuing the creaming process. All the sugar should never be added to the fat at a time as it will adversely affect the aeration process and it may take extra time to achieve desired results. When adequate aeration is achieved, the mixture becomes very light and brighter in appearance.
- When adequate aeration is achieved in the fat sugar mixture, eggs are added gradually. It is a good practice to whip the eggs to stiff froth before adding to the creamed mixture. Flavouring agent may be added to eggs which will ensure its thorough dispersal in the mixture.
- Eggs should be at room temperature (70-75ºF) at the time of adding to the cream.
- When whipped eggs are added to the creamed mixture little at a time and mixed gently, the air-cells of whipped eggs diffuse into the air-cells already present in the cream and the liquid part of egg is evenly distributed in the mixture giving it a smooth velvetty appearance. If the batter is curdled due to poor quality or improper mixing of egg, a small quantity of flour should be added and mixed gently. This flour will absorb the excessive moisture and the mixture will again become smooth. When all the eggs are amalgamated, the mixture should have a smooth, light and velvetty appearance.
- Next stage is to incorporate flour in the mixture. Flour should be sifted thrice with baking powder and other dry ingredients like corn flour, milk powder (if these are used) in order to ensure a thorough blending.
- Incorporation of flour in the cream is an important stage in cake making and even slight mishandling of the mixture will spoil the cake. This operation should be carried out in a fashion that the flour is evenly mixed with a minimum possible mixing operation.
- Flour should not be added in one lot but it should be divided into two or three portions of convenient size and one portion should be added at a time. If any fruits are to be mixed, these should be added alternately with flour.
- When all the flour is mixed, it may be necessary to add some moisture to bring the consistency of the mixture to a definite level of softness. If milk solids are already used along with flour, then water is used for this purpose, otherwise liquid milk is used. The mixture is now ready for baking.

2. Flour Batter Method

- In this method, fat and a quantity of flour not exceeding the quantity of fat is creamed together, fat should be in a smooth and plastic state and the flour should be added gradually. The whole mass is whipped till it becomes light and fluffy.
- Eggs and an equal quantity of sugar is whipped to a stiff froth. The mixture of egg and sugar will whip better if the mixture is slightly on a double boiler. Direct heat should be avoided in this case as even slight rise in temperature will cause coagulation of egg proteins which will lose its air entrapping capacity. Unless the egg-sugar mixture comes down to room temperature, it should not be added to creamed mixture.
- When egg-sugar mixture is whipped to a stiff froth, it is amalgamated in the creamed mixture of fat and flour. Although there is less risk of curdling of the batter, still the egg mixture should be added in small portions at a time and after each addition, it should be mixed thoroughly and then only next portion should be added.
- At this stage, the remaining sugar is dissolved in milk or water and added to the mixture. Any colour and flavour are also added along with the milk.
- Lastly, the remaining flour, which has been sifted (thrice) with baking powder, is added and mixed. During the last stage of mixing if the formula is rich, the mixing operation should be carried out lightly.
- In case of very cheap cakes, where there is less quantity of fat and eggs and more of flour and sugar, some difficulty may be experienced in mixing this large quantity of flour and sugar. In such case, milk, sugar and a quantity of flour equal to that of milk is mixed into a smooth paste and added. The remaining flour should be sifted with baking powder and added at the last stage of mixing.
- Flour batter method is specially suitable for making lean cakes which do not contain much fat or eggs and most of the aeration is achieved through baking powder. Initial creaming of fat and flour, thorough whisking of egg and sugar, presence of enough moisture during the last operation of mixing are some of the factors due to which toughening of gluten is avoided and the cake acquires a good texture.

3. Blending Method

This method is suitable for making high ratio cakes in which quantity of sugar is more than the quantity of flour. Usually emulsified type of shortening and special cake flours are used for making high ratio cakes. In this method emulsified shortening, flour, baking powder and the salt are whipped together to a very light and fluffy consistency. Sugar, milk, colour and flavour are mixed together and added to the previous mixture. Eggs are added next and the whole mass is mixed to a smooth batter.

4. Boiled Method

This method is used for making good quality maderia cakes. Butter or margarine is placed in a bowl and heated till it melts and water in them actually starts to boil (hence

boiling method). The bowl is removed from heat and all the flour are added at a time and mixed thoroughly. Egg and sugar is beaten to a stiff sponge. Colour and flavour may be added while whisking the sponge. This sponge is added to the fat flour mixture in about 4 to 5 equal parts. After each addition of sponge, it is thoroughly mixed with a wooden spoon. When the mixture is smooth, the mixture is baked in moulds lined with grease-proof paper for making maderia cakes.

5. Sugar- Water Method

In this method, all the formula sugar and approximately half its quantity (sugar) of water is agitated in a bowl till all the sugar is dissolved. Then the remaining ingredients except egg are added and the mixture is well agitated to acquire aeration. Lastly, egg is added and the mixture is cleared. Due to more aeration and better emulsification obtained in this method, the cakes so produced have better texture and longer shelf life.

6. All in One Process Method

In this process, all the ingredients are put into the mixing bowl together. Aeration of the mixture is achieved by controlling the speed of the mixer as well as the mixing time.

Baking of cakes

- Different kinds of cakes are baked at different temperatures.
- The temperature is adjusted according to richness of the formula, size of cake and number of units required to be baked at a time.
- Richer the cake lower the temperature of baking. Rich cakes contain more amount of fat and eggs and they acquire all its aeration during creaming of fats and sugar or during whipping of eggs. If rich cakes are baked at high temperature there will be faster crust formation on cakes.
- Lean formula contain less amount of fat and eggs. All the aeration in such cakes is achieved by baking powder. Lean cake – batter is thinner than rich cake batter. Such cakes are baked at higher temperature so that the evolution of gas from baking powder, acquiring of volume by cake and setting of structure of cakes take place simultaneously.
- Cakes baked as large units have a slow and gradual expansion in the oven which is possible when the baking temperature is low. Smaller units of cakes require less baking time. Faster setting of structure is made possible by baking at higher temperature.
- Lining the moulds with paper, covering the cakes in the oven with moist brown paper are some of the means to cut down the absorption of heat by cakes.

Baking and Cooling loss

- Excessive baking and cooling loss will result in dry-eating cakes.
- Most important factor in determining baking and cooling loss in cakes is the amount of batter filled in a given size mould and the depth of the mould.

- A mould should be filled with sufficient amount of batter, so that when due expansion has taken place during baking, the mould more or less contains (filled with) the cake.

Baking Temperatures

Most cakes are baked between 375ºC to 400ºC. If cakes are baked at too low temperatures, the gas evolved from baking powder will escape before the structure is set, resulting in small volume, flat appearing cakes. On the other hand if the cakes are baked at too high temperature, the cake will peak and burst from the centre and also will be tough. As a rule large cakes and rich cakes should be baked at lower temperatures while lean cakes and smaller cakes should be baked at slightly higher temperature.

8.2. Types of Cakes

There are two classes of cakes:

I. Shortened cakes (eg.) white, chocolate and pound cakes

II. Unshortened cakes (eg.) Angel cakes, sponge and chiffon cakes

I. Shortened Cakes

The shortened cakes contain fat as an essential ingredient and are leavened chiefly with baking powder. These include white, yellow and chocolate cakes and pound cakes. Shortened cakes are of two types, the standard shortened cake or butter cake leavened by carbondioxide from baking powder and pound cake which has no added leavening agent, apart from air, incorporated in the cake. The texture of the two types of shortened cakes are different. Pound cakes have a close grain and are compact in character. A good shortened cake has fine grain cells of uniform size and thin cell walls.

- The major ingredients of shortened cakes are eggs, sugar shortenings and some flavouring agents.
- Shortened cakes are made from cake flour or all purpose flour.
- The liquid used in cakes is mainly milk in different forms. Sometimes fruit juices or pulps are used.
- Eggs contribute to the structure of the cakes and egg-yolk emulsifies the shortenings in the batter.
- Sugar affects the flavour and structure of the cake.
- Butter is the most common shortening used. Margarine or any hydrogenated vegetable oil can be used in its place. The fat serves the important function of entrapping air during the creaming process, thereby leavening the batter and increasing the volume of the baked cake.
- Many flavouring materials like vanilla, spices and synthetic flavours are used in small quantities in cake preparation.
- Other ingredients added for flavour are cocoa, chocolate, fruit juices and other forms of fruits.

Method of preparation

- Dry ingredients are sifted together and then, when the shortening and half or most of the milk have been added, the mixture is blended for a set length of time.
- A shortened cake batter can stand for some time, but it is better to bake it as quickly as possible after being mixed. Shallow pans are better than deeper pans for cake baking.
- The oven temperature commonly used for baking shortened cake ranges from 177ºF to 191ºF. Cakes when fully baked should not be removed immediately from the oven. They should be allowed to stand for 15 to 20 minutes before they are removed and this helps the interior of the cake to become firm.

II. Unshortened cakes

These include angel cake, sponge cake and chiffon cakes.

Angel cakes

- The basic ingredients of angel cake are flour, sugar and egg. The other ingredients are salt, flavourings and cream of tartar or an acid.
- The proportion of sugar in the cake mix is high because no other tenderizer is used. Sugar interferes with gluten development and thus tends to produce a more tender and fragile cake, when used in increasing amounts.
- Sugar also has a stabilizing effect on egg-white foam and allows more beating without the over coagulation of the white proteins.
- Cream of tartar is added to egg-whites for angel cake for it makes the cake whiter, finer in grain and more tender.

Method of preparation

- Egg-whites are beaten so that a fine division of air-cells takes place to produce a fine cake with large volume.
- To the properly beaten egg-white at room temperature, cream of tartar and salt are added and the beating is continued until the foam forms peaks.
- A portion of sugar is then added and beating at slow speed is continued when aircells surrounded by film of syrup containing egg proteins are formed.
- Egg-white foams, into which sugar has been incorporated is known as ‘meringue’. Thus angel cakes are meringue cakes.
- Finally flour is folded into the meringue so that flour particles are uniformly distributed in the syrupy film around the aircell. The mixture is transferred to the pans and baked at 177ºF.

Sponge Cakes

- These do not differ much from the angel cake except that both egg-yolk and egg white are used.
- Lemon juice is generally the acid ingredient.

- The egg yolk are beaten until they are thick. Then sugar, salt, water and lemon juice are added and the whole mass is beaten until it is fluffy.
- The flour is folded lightly into the mixture, after which the egg-whites beaten stiff but not dry are folded.
- Instead of using separated egg components, the whole egg itself could be used.
- The eggs and lemon juice are beaten until the mixture is stiff and the sugar is added to the egg mixture with gentle mixing. The mixture is transferred to the pans and baked at 177ºF.

Chiffon Cakes

- Chiffon cakes usually contain a larger proportion of egg than shortened cakes and an oil.
- The cake is prepared by sifting together the dry ingredients followed by the addition of the oil, egg-yolk, liquid, flavourings and the whole mixture is well blended.
- The whites are then beaten with the cream of tartar until the peaks just bend over; the batter is carefully but thoroughly folded into the beaten whites. The cakes are then baked in the usual way.

8.3. Qualities of a Standard Cake, Cake Faults and Remedies

Qualities of a Standard Cake

Chief characteristics of cakes are as under:

External	Internal
1.Volume	1. Grain
2. Colour of crust	2. Colour of crumb
3. Symmetry of form	3. Aroma
4. Character of crust	4. Taste
	5. Texture
	6. Keeping quality

External Qualities

1. Volume: It is rather difficult to set standards for volume of cakes which will vary according to different types of cakes and also according to consumer preference. However, the cakes should not have a pinched appearance and they should not appear overextended too. A well risen cake will have a pleasing appearance with slight convex top surface. Although the relative weight of a particular volume of cake will differ in different types of cakes, but a cake should not appear too small or too large for its weight and good construction.

2. Colour of Crust: Colour of the crust differs in different types of cakes so no one term is applicable to all kinds of cakes. The crust must have a pleasing golden brown colour. Too dark or too light or dull colours are not desirable. Crust must have a uniform colour, free from dark streaks or sugar spot or grease spots. The ideal colour of the type of cake to be scored should be known so that the crust colour may be scored accordingly.

3. Symmetry of Form: Cakes should have a symmetrical appearance, peaking, crack in the centre, low sides, sunken or high centre, burst, caved in bottom or uneven top are undesirable characteristics of cakes.

4. Character of Crust: This term applies to the condition of the crust and will vary some what with the type of cake. Some cake crusts should be more tender, than other, however, the crust should not be too tender, so that it breaks too readily. The crust must have a pleasing golden brown colour. Crust of a good cake should be thin and tender. Thick rubbery, sticky or over moist, too tender or blistery crust is indicative of poor quality cakes.

Internal qualities

1. Grain: The grain is the structure formed by the extended gluten strands including the area they surround. Grain will vary according to the type of cake. Pound cake for instance should have a very close grain while all other cakes should have a medium to close grain. However, uniformity of the size of cell and thin cell walls are desirable to have grain pertains to the size, shape and character of the cell structure of the crumb. Coarseness, thick cell walls, uneven size of cells, large holes and tunnels are indicative of poor grain. Grain should not be too open or too close. The cake should be cut across the middle in judging the grain.

2. Colour of Crumb: Crumb should have a lively, lustrous and uniform colour. The colour of the crumb in the cakes varies with the kind of cake made. Gray, non-uniform, dark, light or dull colour of crumb will be undesirable. The degree of deepness of colour will depend upon the formula and ingredients used.

3. Aroma/odour: Aroma of a good cake should be pleasant, rich, sweet and natural. It is not desirable to have any foreign aroma. The air in the cell structure carries the odour and this should be rich, sweet, fresh and natural odour. Flat, musty, strong or sharp aroma is indicative of poor quality cakes.

4. Taste: Taste of a cake should be pleasant, sweet and satisfying. Cakes should not leave any after taste in the mouth, should not have a bland taste and should also not have any foreign taste. (i.e) taste which cannot be acquired by the use of normal ingredients of cake. Use of excessive salt or soda will also adversely affect the taste.

5. Texture: For judging texture a freshly cut surface is required. The tips of the fingers are pressed lightly upon the cut surface and are moved gently over it. It depends on the physical condition of the crumb and type of grain. A good texture is soft and velvetty without weakness and should not be crumbly. Rough, harsh, too compact, lumpy or too loose texture is not desirable.

6. Keeping Quality: Keeping quality in a cake is very important especially in packaged cakes, for these cakes, are usually kept longer before reaching the consumer. Different types of cakes will vary in keeping quality due to richness, methods and ingredients used. However, regardless of the kind or type of cake it should have good keeping quality, that is it should stay in fresh or moist condition without moulding.

Cake faults

Reasons for faults in cakes may generally be grouped as follows:

1. Wrong quality of raw material.
2. Improper balancing of formula.
3. Operational mistakes.

Common Cake Faults and Their Remedies

The cake faults are broadly divided into,

1. Shape faults
2. Structural faults
3. Texture faults
4. Crust faults
5. Colour faults
6. Miscellaneous faults

The above details are given in Table 8.1.

Table 8.1: Cake Faults and Remedies

S.No.	Possible causes	Effects and remedies
1.	**Shape faults**	
a.	**Collapsed cake with white surface spots**	
	i.Too much sugar	Too much sugar in the formula causes the cake to collapse and leaves sugar particles showing as white spots on the top surface of the cake. To avoid this, the formula must be correctly balanced and the sugar correctly weighed.
	ii.Too little liquid	Underweighing of liquid can also cause a similar fault.
b.	**Cake with peaked top**	
	i.Flour too strong	Soft flour is normally used for general cake making. When a strong flour is used for cakes, the cake batter develops. This has a toughening effect on the batter which causes peaking.
	ii. Insufficient aeration	This can be caused by incorrect mixing either over or under mixing. Correct mixing time and batter consistency should be observed.
c.	Cake with flat top	Sugar and leavening agents are the ingredients which tend to open the texture of the cake. Too much of baking powder or sugar will cause the cake to expand beyond the holding powers of the structural ingredients, flour and egg. This will result in a slight collapse giving a flat topped cake with an open texture. Correct formula, balance and careful weighing of the ingredients will avoid the fault.

S.No.	Possible causes	Effects and remedies
2.	**Structural faults**	
a.	**Underbaking**	Under baking results in a higher moisture concentration which produces a damp or apparently unbaked area. If this occurs and the top crust is highly coloured, baking temperature should be reduced by 10ºF and the baking time increased.
b.	**Tunnel like holes in the cake**	
	i. Toughening of the batter	This results from overmixing in the final stage. The flour should be carefully cleared until it is evenly distributed through the mix after which the mixing should be stopped.
	ii. Lumps of unmixed fat in the batter	This is due to under mixing or bad scrapping down of the bowl and beater when the mixing is done with machine. Care should be taken to follow the correct mixing procedure and to scrape out efficiently.
3.	**Texture faults**	
a.	**Texture too close**	
	i. Insufficient baking	The cake is under-aerated and heavy. Again care must be taken when weighing baking powder.
	ii. Too much liquid	This will close the cake and cause it to lack lightness. Clear marking of containers for chemicals used in the bakery will help to prevent this problem.
b.	**Coarse texture**	
	i. Too much baking powder	Too much baking powder gives overaeration and an open texture and also an acid taste. Careful observance of the cake formula will prevent overweighing of the baking powder.
	ii. Oven too cool	As a hot oven will restrict the expansion of the cake during baking, so a cool oven will allow too much expansion and open up the cake texture. Careful baking at the correct oven temperature will prevent this problem.

S.No.	Possible causes	Effects and remedies
4	**Crust faults**	
a.	**Thick crust on cake**	
	i. Baking fault	If the oven as a whole is too hot a heavy crust will be produced all round the cake. When only the top heat is excessive the top crust will be thicker. Careful baking at correct temperature will overcome problems of this type.
b.	**Cracks on surface of the cake**	
	i. Dry oven temperature	This causes the crust to set early and the slab to crack. Too much injected steam will also cause surface cracks.
5	**Colour faults**	
a.	**Discoloured crumb in fruit cake**	
	i.Type of sweetening agent	Moist sugars and other materials such as golden syrup and honey will caramelize more readily than granulated sugars and the baking temperature should be reduced by 10º-15ºF when they are used. Upto 10% of the total sugars can be replaced by moist sugar, syrup or honey without much risk of discolouration.
b.	**Very pale crust colour**	
	i. Lack of milk	Omiting milk powder or using water instead of milk affects crust colour as the milk sugar also caramelizes during baking. It is a bad practice to use water alone because the appearance and flavour of the cake suffer.
	ii. A wet oven temperature	Excessive steam in the oven should be avoided because this acts as an insulator, inhibiting the baking of the crust.
6	**Miscellaneous faults**	
a.	**Mold growth in cakes**	
	i. Excessive moisture	Cut surfaces or outer crusts of cake to become very moist will increase the risk of mold development. Baked goods should always be stored in a cool and dry place.
	ii. Contamination	Care should always be taken to avoid contamination. Avoid packing in contaminated wrappers. All wrapping materials should be covered during storage.

8.4. Cake Decoration – Types of Icing

Icings: Icings are sweet coverings – plain or with vivid pattern in which sugar is the main ingredient. Type of an icing depends upon the materials used in the preparation as well as the method of mixing. There are various types of icing which can be classified under two groups.

1.Flat icings: Those icings which look like flat icings including a fondant are melted by heat and when cooled will set to a firm coating. Fondants contain a high proportion of small sugar crystals that partially dissolve on warming and recrystalize on cooling.

2. Creamed icings: Those highly aerated icings are composed of a creamed mixture of shortening, confectioner's sugar, water, salt, flavour, eggs and milk powder. These are more suitable for spreading and piping where aeration or whipping is used to produce icings of stiff, non-flowing consistency.

The basic and functional ingredients of icings are as follows:

1. Sugar: Various types of sugar can be included in the preparation of icings. The most common is the powdered sugar or confectioner's sugar. Invert sugar, corn sugar and glucose are also used in flat icings to control the size of sugar particles.

2. Shortening: Emulsified or hydrogenated shortening is usually used in cream type icings. Shortenings should be neutral in taste and flavour. Butter is also used in combination with shortening due to its characteristic flavour. Butter also cannot be creamed to give an equal volume of shortening.

3. Dried milk powder: Milk powder provides a structure to the icing as well as enhances the taste and flavour of the icing. It also helps to absorb the moisture. Fresh milk is not recommended due to its perishable nature. Milk powder should always be sieved along with sugar to avoid the lumps. In case, the lumps are present it will be difficult to pipe the icing with a fine nozzle.

4. Eggs: Eggs should be fresh. They contribute to the volume, taste and flavour of the icing. They should be blended carefully with the creamed mixture to avoid curdling.

5. Stabilizers: Various types of stabilizers are used in icing, mainly to absorb excess moisture. By holding the moisture a stabilizer can avoid sugar crystallization. It also can eliminate stickiness during hot humid weather. Stabilizers may be vegetable gums, tapioca, starch, pectin and wheat or corn starch. Water is used to dissolve the sugar in the preparation of icings. Water also permits the boiling of sugar without burning. Flavours and colours should be used wisely and carefully. Salt, when used in small quantities, enhances the taste and flavour of the other ingredients.

a. Flat icing: Flat icings are the combination of confectioner's sugar, water, corn syrup and flavour. All the ingredients are to be mixed to a thick paste consistency and warmed to about 110ºF. To avoid direct or overheating of icing, a double boiler method of heating should be used. Many times due to overheating an icing losses its gloss after cooling. Whenever flat icings gets thickened after its make up it should be rewarmed to bring to the

correct consistency required. The icings should not be softened with water before they are reheated, otherwise it will cause stickiness in icings and also cause difficulties in setting.

b) Creamed Icings: Creamed icings are prepared with fat, confectioner's sugar, water, salt, flavour, eggs and milk powder. The general procedure is to cream the dry ingredients with shortenings. The beaten eggs are added gradually. The water and flavouring is added in the end, blending well. Creamed icings should be stored in a cool place and should be kept covered to avoid crust formation. Creamed icings have a tendency to lose their smoothness after a long storage. In such cases icings will not have the ability to spread smoothly and evenly. In order to restore their smoothness they should be placed in warm water bath and creamed well until smooth. Do not over heat to avoid fat from melting away.

Icings also play a helpful part in retarding the staleness of the product. This depends mainly upon the type of icing used. Flat icings which do not contain appreciable amount of shortening will have a tendency to absorb the moisture from the cake. Creamed icings are much more effective in controlling the rate of staling.

Butter icing

Ingredients

Butter	– 250g
Icing sugar	– 500g
Vanilla essence	– 1 tsp
Colouring	– as desired

Method:

- Cream butter to a smooth consistency.
- Add icing sugar little at a time and cream
- Finally add vanilla essence and colour as desired.

Note: For masking the cake the consistency of icing should be soft while, for piping borders it should be stiffer.

Cake Decorations

8.5. Pastry

It is a mixture of flour, fat, possibly egg and sugar, the fat usually dispersed as small solid globules coated with flour and the whole brought together with liquid prior to shaping and baking. Pastry is the name given to various kinds of baked goods made from ingredients such as flour, butter, shortening, baking powder or eggs. Small cakes, tarts and other sweet baked goods are called 'pastries'. Pastry dough is rolled out thinly and used as a base for baked goods. Common pastry dishes include pies, tarts and quiches.

Pastry is distinguished from bread by having a high fat content, which contributes to a fatty or crumbly texture. A good pastry is light and airy and fatty, but firm enough to support the weight of the filling. When making a short crust pastry, care must be taken to blend the fat and flour thoroughly before adding any liquid. This ensures that the flour granules are adequately coated with fat and less likely to develop gluten. On the other hand, overmixing results in long gluten strands that toughen the pastry. In other types of pastry, such as Danish pastry and croissants, the characteristic flaky texture is achieved by repeatedly rolling out a dough similar to that for yeast bread, spreading it with butter and folding it to produce many thin layers of folds.

Types of Pastry

Short Crust Pastry

Short crust or short pastry is the simplest and most common pastry. It is made with flour, adding water and rolling out the paste. It is cooked at 180ºC and the result is a soft, tender pastry. A related type is the sweetened sweet crust pastry.

Flaky Pastry

Flaky pastry is a simple pastry that expands when cooked due to the number of layers. This is perfect if it is looked for a crisp, buttery pastry. The puff is obtained by beginning the baking process with a high temperature and lowering the temperature to finish.

Puff Pastry

Puff pastry has many layers that cause it to expand or 'puff' when baked. Pastries are made using flour, butter, salt and water. Pastry rises up due to the combination and reaction of the four ingredients and also from the air that gets between the layers. Puff pastries come out of the oven light, flaky and tender.

Choux Pastry

Choux pastry is a very light pastry that is filled with cream. The pastry is filled with various flavours of cream and is often topped with chocolate. Choux pastries can also be filled with things like cheese, or chicken to be used as appetizers.

Phyllo Pastry

Phyllo pastries are usually paper thin and greatly stretched. They involve several stretched out layers and are wrapped around a filling and brushed with butter. These pastries are very delicate and can break easily.

Method of Preparing Puff Pastry

Puff pastry is a rolled pastry in which layers of shortening are interlaced between layers of dough so that, upon baking an open network of crisp and flaky layers are formed. The main ingredients used in puff pastry making are flour, shortening, salt and water. A traditional method of processing puff pastry is as follows:

- Mix a dough consisting of 2¼ kg bread flour or a blend of 8 parts of bread flour and 2 parts cake flour, 75g salt and 450g water
- Shape the dough into a rectangular form and keep it in a cool place preferably in a refrigerator. When the dough has cooled down, roll it out to one-third inch thickness retaining the rectangular shape.
- Cover two-thirds of the rolled dough by spreading 2¼ kg shortening and fold it over so that three layers of dough are separated by two layers of shortening. Roll the dough again to one third inch thickness and fold similarly into three layers.
- Return the dough to the refrigerator and allow it to rest for about an hour. Always cover the dough from drying away. Repeat the process of sheeting and folding and once again refrigerate the dough. Repeat the process once or twice.
- After cooling the dough, roll it and cut into desired shape. Finish baking at 375ºF for 10 to 20 minutes.
- Rich egg wash is used prior to baking to improve the appearance of the finished products.
- The fillings – savoury as well as sweet – enhance the eating qualities of the puff pastry. As far as possible the filling should be done after the products are baked. This will prevent the finished products having a soggy bottom, due to improper baking.

Puff Pastry

Questions

PART - A

I.A) Choose the Correct Answer

1. Baking powder acts as a ____________ in cake making
   a) Structure builder b) Tenderizer c) Moisterer
2. Maderia cakes are made from ____________ flour
   a) Medium b) Soft c) Combination of medium and soft
3. Golden brown crust colour formed in cake is due to ____________
   a) Shortening b) Eggs c) Caramalization of sugar
4. ____________ retains the moistness in a cake
   a) Sugar b) Flour c) Shortenings
5. ____________ present in egg yolk acts as an emulsifier
   a) Lecithin b) Gluten c) Avidin
6. ____________ type of baking powder releases Co_2 gas during mixing
   a) Slow acting b) Fast acting c) Double acting
7. ____________ is an example of shortened cakes
   a) Pound cakes b) Angel cakes c) Sponge cakes
8. Angel cakes are ____________
   a) Shortened cakes b) Unshortened cakes
   c) Both shortened and unshortened cakes
9. Tha acid ingredient of sponge cake is ____________
   a) Lemon juice b) Citric acid c) Cream of tartar
10. An example for stabilizer is ____________
    a) Egg b) Vegetable gum c) Shortening

B) Answer in one or two sentences

1. Write the essential ingredients of cake making.
2. Classify cake making ingredients.
3. Write any two tenderizers used in bakers products.
4. Mention the type of cakes in which soft flour is used?
5. Write on the sweetening agent used in cake making.
6. Give examples for liquid sugars.
7. What is the role of water in cake making?
8. What is mechanical aeration?
9. List the different types of flavouring ingredients.

10. Give the meaning of emulsions.
11. Write the nature of fats in cake making.
12. Name the method used for making maderia cakes.
13. Mention the temperature of baking cakes.
14. Give examples for unshortened cakes.
15. Name the ingredients used for making angel cakes.
16. Point out any two external qualities of cakes.
17. Why holes are formed in cakes?
18. Name any two types of pastries.
19. Identify any two texture faults in cakes.
20. What is invert sugar?

PART - B

II. Answer in five lines

1. What is the role of leavening agents in cake making?
2. Give a short note on the different types of baking powders.
3. List the types of cake making.
4. Explain the role of eggs in cake making.
5. Mention the types of cakes and give examples.
6. Differentiate angel cakes and sponge cakes.
7. List the external characteristics of a standard cake.
8. Enumerate the internal characteristics of a standard cake.
9. Write on common cake faults.
10. Why some cakes are coarse in nature? How do you prevent it?
11. Write short notes on icings.
12. Why stabilizers are used in icings? Explain.
13. Differentiate flat and creamed icings.
14. Bring out the characteristics of flaky pastry.
15. What is choux pastry?

PART - C

III. Answer should not exceed one page

1. Discuss the role of essential ingredients in cake making.
2. Explain the moisteners used in cake making.
3. Write a note on shortened cakes.
4. Elaborate on angel and sponge cakes.
5. Write in detail about the external qualities of a standard cake.
6. Discuss the internal qualities of a standard cake.
7. Explain the shape and texture faults of a cake and write the preventive measures.
8. Write short notes on creamed icings and write the recipe for butter icing.
9. Describe the different types of pastries.
10. Write the general procedure for preparing puff pastry.

PART - D

IV. Answer in Detail

1. Explain sugar-batter method of cake making.
2. Write in detail about the qualities of a standard cake.
3. How do you bake a cake? Explain.
4. Discuss the methods of cake making.
5. Explain the shortened and unshortened cakes.

9. PRESCHOOL EDUCATION

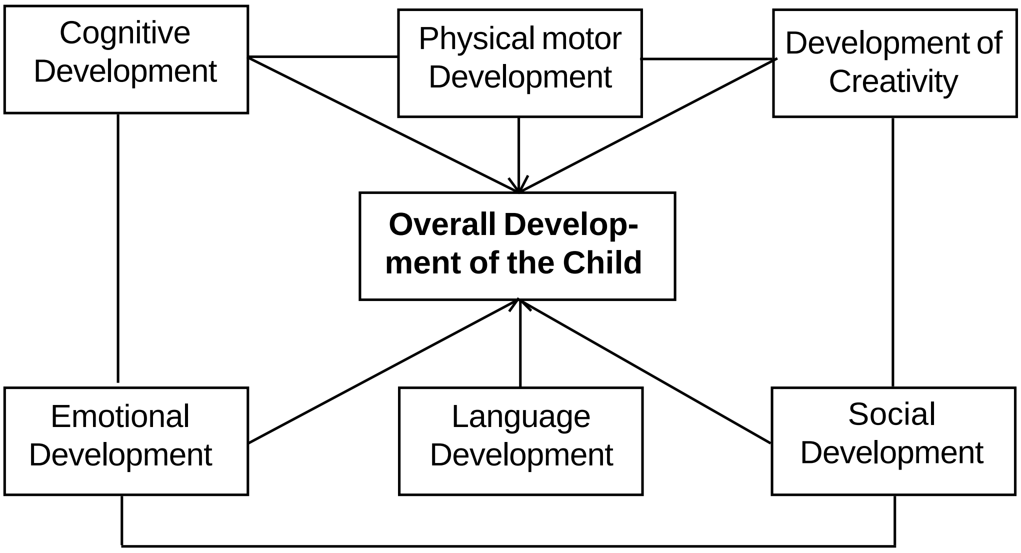
9.1. Preschool Education – Objectives and Significance

It has been often claimed that the destiny of a nation is shaped in its classrooms. During an individual's life there are certain periods when for no clear reasons learning is at its peak, ie., at certain periods in life there exist possibilities for making mental acquisitions which are no longer possible at other stages. These are called critical periods or sensitivity periods. During these periods the child demonstrates unusual capability for acquiring skill and degree of competence.

Regardless of how much stimulating environment children are provided, they do not learn until they are mentally mature. A good environment is very essential for proper development. By good environment it is meant a stimulating environment that is full of reinforcement, motivation and positive experiences for the child, an environment the child does not get bored of living and finds an expression of his innate abilities, thoughts and desires. It is clear that child growth and development are continuous processes of learning and maturation is dependent on them. Proper learning can not take place in vacuum, it needs a stimulating environment rich in experiences which help the child to explore the world.

Need for Nursery Education: All children have the right to learn and every child must be enabled to achieve his/her potential for growth and development through appropriate ways. Educationists have concentrated a great deal of attention on early years of a child's life. It has been fully appreciated that the first six years of a child's life are impressionable. It is during these years that the foundations of mental, moral, physical, social, emotional, language and aesthetic development are laid. The development of over all personality of an individual is achieved by the following ways:

The Overall Personality of a Child



This stage is also crucial in terms of the child's development of interests, attitudes and values. All the parents inspite of their love for their children are not equipped to give

them proper guidance and training. Even those who have the knowledge, rarely have the time, struggling with poverty or the increasing pace of modern living. The changing patterns of society due to rapid industrialization demand that the children are given greater attention than ever before. Establishment of good Balwadis, Nursery schools or preschools can help in this endeavour. Pre school education needs to be recognized as a pre requisite for the healthy mental and emotional development of children.

Need for preschool: The dictionary suggests it to be an educational institution for children too young for elementary school. For parents, it is a common place where toddlers meet, play and spend time together under the supervision of a teacher or two.

- Pre school may not be a place where formal education is imparted but yes, it is definitely a place where children have their first taste of independence. Today with both parents working, preschool is becoming an inevitable part of a child's life. The independence relates to a child remaining away from his parents a couple of hours, thus breaking free off the separation anxiety.
- At play schools, children are exposed to a lot of basic pre school learning activities that help them to get independent faster. These pre school activities help to develop in children many self-help qualities like eating themselves, dressing up, maintaining cleanliness and other such basic qualities.
- Besides this, preschool learning activities help the children learn basic etiquettes like exchanging greetings, sharing of food and toys, identifying their possessions etc. Children interact with children of their own age and tend to develop language skills at a faster pace with more vocabularies to their credit.
- Play schools prepare children for the bigger school instilling self confidence and independence in them.
- It is more advantageous if the right kind of preschool where the students teacher ratio is being followed and the concepts of play school are very clear. Since it is a guiding light which the innocent soul is bound to follow blindly, it needs to be the best.

Objectives of Pre school Education

- To develop a good physique, adequate, muscular co-ordnation and basic motor skills in the child.
- To develop good health habits and to build up basic skills necessary for personal adjustment such as dressing, toilet habits, eating, washing, cleaning etc.
- To develop desirable social attitudes and to encourage health group participation making the child sensitive to the rights and privileges of others.
- To develop emotional maturity by guiding the child to express, understand, accept and control his feelings and emotions.
- To encourage aesthetic appreciation.
- To stimulate the beginning of intellectual curiosity concerning the environment and to help him understand the world in which he lives and to foster new interests through opportunities to investigate and experiment.

- To develop the child's ability to express his thought and feelings in fluent, correct and clear speech.
- To encourage independence and creativity by providing the child with sufficient opportunities for self-expression.
- To develop positive emotions such as trust, love, a sense of belonging, achievement, tolerance, equality and dignity of labour by providing various activities like painting, gardening etc.
- To stimulate aesthetic appreciation by providing opportunity to express ideas and to experiment with colour, balance, symmetry, appreciating the beauty of nature by going excursions, nature walk etc.

Types of Preschool: Some outside the home care for children is little more than baby sitting. While other options are designed to promote intellectual and social advances. Among the major choices of later type are the following,

- Day care centres
- Montessori school
- Kindergarten
- The nursery
- Balwadi
- Anganwadi

- **Day Care Centre:** It is typically to provide care for children all day, while their parents are at work.Many day-care centres were first established as safe, warm environment where children could be cared for and could interact with other children. Today their purpose tends to be broader, aimed at providing some form of intellectual stimulation. Still their primary purpose tends to be more social, emotional and cognitive.
- **Montessori school**: Montessori schools are patterned after the educational philosophy of Maria Montessori. She succeeded in teaching mentally retarded children to read, write and pass examinations designed for normal children.
- **Kindergarten**: some experts on early childhood education believe that the curriculum of too many of today's kindergarten and pre school programmes place too much emphasis on achievement and success, putting pressure on young children too early in their development, placing such heavy emphasis on success is not what kindergartens were originally intended to do. According to Friedrich Forebel's "Kindergarten is literally a garden for children. Like growing plants children require careful nurturing. Child garden focused on that children should be allowed to choose activities of their interests.
- **The Nursery School**: The nursery school concept began in England by Margeret McMillan sisters in England. They opened children's clinic to provide physical care under healthful condtitions. Then later expanded to nursery. It is meant for children between the age of 2 and 7 years.

- **Balwadi:** Balwadi means a rural preschool run economically but scientifically and using as many education aids as possible prepared from locally available materials (Grewal, 1984). It is an indigenous type of nursery school.

Teaching young children is challenging and rewarding though time frustrating. It is an awesome responsibility to influence the lives of children from day to day during their most formative years. Young children should be consciously controlled and systematically directed. Development of the young child is essentially a process of unfolding the child's inherent potentialities to learn and to acquire knowledge. Learning environment in a structured organized way with appropriate material will guide the child properly.

According to Forebel the originator of the kindergarten, preschool stage is an essential step in the whole ladder of educational experience. In the process of educating the children, each child's individuality must be respected. According to Dakshayani (1969) a child who goes to nursery school before joining the primary school adjusts himself much better and stands high in academic achievement in the class. Thus preparation in the nursery school helps the child considerably in his mental readiness and subsequent education.

Children in Classroom

9.2. Infrastructure of Preschool

The preschool is the living place for an organic community of growing children primarily interested in educating them the “gracious art of living” and not a place of formal learning where the main purpose is to communicate a certain prescribed quantum of knowledge. The preschool environment thus may help or hinder the realization of these goals. The building which houses the preschool may be stimulating or stiffing and may be conducive or inhibiting the development of children.

The first requisite for gracious living is a clean, pleasant and well maintained building. Children spend most of their time during the day in the preschool rooms or grounds. The surroundings are bound to exert a far reaching influence on their growth and health. The preschool is actually a supplement of the home and not a substitute. Good spacious building, playground and equipment facilitate learning of variety of programme in the pre school. Therefore the school building, its situation, design, lighting and ventilation all have an important role to play in the behaviour and welfare of children.

Essentials of a Good Building: The essentials of a good preschool building are,

1. Surroundings 2. Site 3. Building plan

1. Surroundings: The surroundings greatly influence child’s health, attitudes and development of personality. A preschool cannot be built anywhere and everywhere to discharge its functions efficiently. The psychological basis for providing wholesome surroundings is the unconscious response of children to aesthetic stimuli. The aim of preschool is to bring about natural, mental, moral and physical development of children. The school building must be located amidst desirable surroundings. Unclean surroundings are detrimental to the mind and body. Ugly surroundings act directly on the subconscious mind and bring about adverse effects on character formation.

2. Site: The factors to be considered in the selection of site for preschool are discussed below,

a. Vicinity: The vicinity of a pre school must constitute a refreshing environment, avoiding stagnant pools, swamps or other settings which are sources of disagreeable odour or mosquitoes, flies and harmful micro-organisms. There should be good water supply. Preschool must be located,

- At short distance from the town to get fresh air.
- Must be near a road.
- Should not be close to a burial ground.
- Away from industrial noise, dust, smoke and pollution.
- Away from factories, rail roads and bus stand.
- Vicinity of grove of trees or high building is not desirable.

b. Soil: Soil makes the school building strong, safe, congenial and educational. The building should be in a,

- Raised area
- dry and have natural drainage and free from water logging.

c. Structure and Elevation: The ideal aspect of a good preschool includes,

- Varanda should be planned on only one side of the rooms for free access of light.
- Planting of trees on the other side will help to serve as sun-breakers and safeguard the building.

3. Building plan: The plans for the preschool buildings will vary based on needs. The following suggestions,would facilitate evolving a desirable blue-print

- The building should be planned to conform strictly to the laws of sanitation, hygiene, ventilation and lighting to allow sun's rays to reach all the rooms without filtering and should permit easy access of fresh air to all parts of the building.
- The building should fulfil the minimum requirements of play rooms, lavatories, and wash room. Each child must have atleast 1.5 square meter of floor area. No play room should be more than 9 meters in length.

Rooms: • Rectangular rooms lend themselves more readily to activities of the children than square ones.

- Free from hidden areas to facilitate supervision.
- All the rooms should be provided with an outlet and inlet.
- The rooms for indoor play should be large enough for children to live and work together.
- The work space should be adaptable, flexible, livable and home like.
- The ceilings should be of safe material to avoid fire hazards.

Walls: • The wall space should be functional and lend itself to promote activities.

- Pinning space at the eye level of the child is desirable in order to have picture boards.
- The arrangement of windows and doors should allow large space for bulletin boards, and black board.
- The walls should be coated with a suitable, washable, porous material to deaden the noise.
- Shifting walls provide for a wide variety of activities and better use of space.

Floors: • The floors should be of such material that they can be cleaned easily and maintained in a sanitary condition.

- It is necessary that warmth and freedom from drafts must be ensured.

Windows and Doors: • The doors and windows are important parts of the learning environment of the young child.

- The windows should be low enough to enable the child to look out and easy to operate.
- All windows need to be fitted with guards, screen, or both.

- All doors should be light in weight so that children can handle easily.

Sanitary Facilities: • The toilet and washing facilities should be easily accessible from both indoors and outdoors.

- The toilet floor should be washable but not slippery.
- Sinks and toilets should be equipped with disposable drains.

Storage Space: • Storage space is necessary in the preschool for keeping play equipment, linen, books, teaching aids and records.

- The cupboards should be equipped with drawers and open shelves according to the specific plans for use.
- All storage space should be well ventilated and kept free from insects and cobwebs.

Outdoor Space: • Children need play ground which is accessible and large enough to be interesting and safe.

- A minimum of 2 square metre of play space per child is desirable.
- The play area should have hard surface area where wheel toys can be used and balls bounced.
- Grassy plot will help for playing, running and romping.
- Spots can be available for pets, gardens and digging play.
- Sand box for sand play and manipulate activities and space for water play should be separate.
- All play space should be free from nails, rocks, broken parts, edges and glass pieces.

4. Plan for a Pre school Building

Keeping the requirements in view we can consider a plan for a building for preschool with the minimum requirements of space. The design for preschool buildings and their use will undergo changes due to one or more of the following reasons:

- Technological developments in construction methods, engineering skills, building material and school equipment.
- Research and experimentation in building design.
- Socio-economic influences on the needs of the preschool and methods of financing them.
- Instructional innovations, especially the emphasis on audio-visual aids and new methods of education.
- Ever-mounting emphasis on the utilization of the school as a community centre.

Furniture arrangement: Small chairs and low tables may be provided for children. For doing creative activities low tables are provided. The size of the table may be 4”x4" with a height of 6”. There should be book rack for arranging books. Mats and thick carpets should be provided for children to lie down in the afternoon.

Cooking facilities:

If the children are given noon meal or snack, food needs to be prepared in the preschool itself. A room for cooking and storing things like vessels, grocery, firewood etc. that are necessary for cooking is very essential.

How can safety be ensured in a preschool:

Basic concern for children necessitates ensuring safety for children

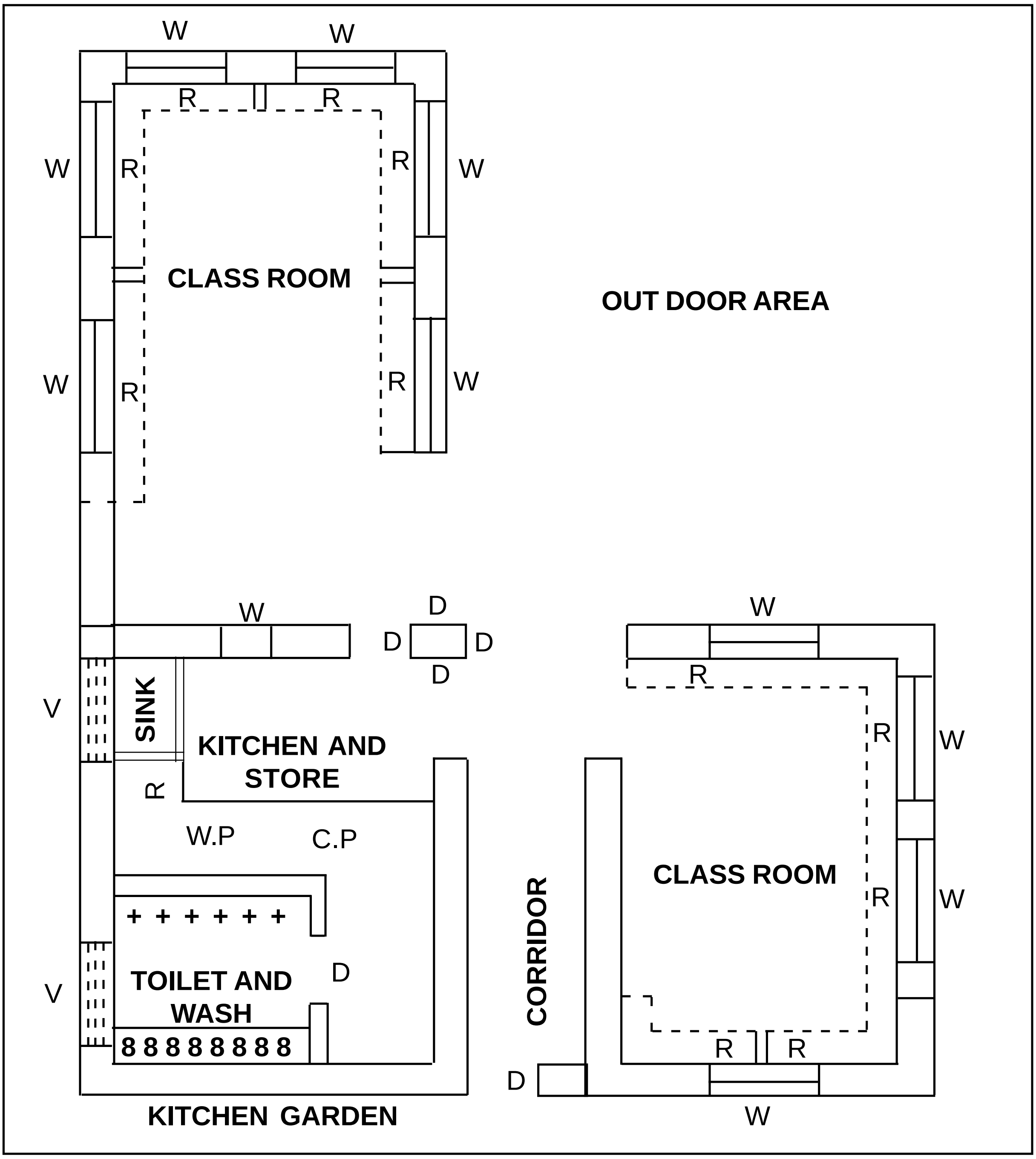
- The doors should be light in weight and not be self locking or swinging type.
- There should be screens / bar guard in all the windows.
- Materials that can harm the children like tools, machines, matches etc. should be stored in areas inaccessible to children.
- No toxic colours or paints should be used for play equipment.
- Play space should ensure safety of children i.e, prevent children from running out and getting hurt.
- The equipment should be placed so as to avoid danger of accident or collision and to permit freedom of movement.
- Any arrangement made by the preschool for transporting children should be safe, comfortable and convenient.
- First aid kit and safety against fire hazards is a must.

The physical environment of the preschool determines to a large extent the quality of healthy living of the children. Effective use of the environment will greatly benefit the young child. Recent research emphasizes that appropriate facilities and equipment can ensure healthy living. The facilities in the preschool should be well utilized to provide optimum opportunities to children for learning.

Even well planned rooms may not contribute to the development of desirable habits and attitudes if they are not kept clean and pleasant. It is essential that attention is given not only to the adequacy of the environment but also its effective use towards developing the physical, mental and social health of children.

Children learn best when they are involved in situations concerning health and safety and helped to practice consistently what they have learnt. The pre school building has a vital role in helping young children develop the desirable habits for life. A model layout plan for a preschool is shown in Figure 9.1.

FIGURE 9.1: BUILDING PLAN OF A PRESCHOOL



Note:

Area of the site	- 350 sq.m
Area of the open space	- 30 sq.m
Area of the outdoor space	- 100 sq.m

D - Door, W - Window, V - Ventilator, R - Rack

W.P. - Working platform C.P. - Cooking platform

9.3. Preschool Planning – Weekly and Daily Schedule (Lesson Plans)

While planning activities for the pre school education, care should be taken that the activities should proceed from simple to complex, known to unknown, and concrete to abstract. The activities should be planned and presented to the child keeping in mind their mental capabilities. Curriculum should be developed on four major principles that is flexibility, relevance, functionality and productivity. For proper implementation of the curriculum, a selection of themes related to the child's life can be carefully done. The programme implementation according to Chard (1989) criteria for selecting a theme includes,

1. Relevance
2. Opportunities for application of skills
3. Availability of resources
4. Interest of teacher
5. Time of year

Based on these, various experiences can be offered to the child.

Characteristics of Balanced Curriculum for Pre Primary School

- A good curriculum for pre primary schooler provides many opportunities for developing social adjustment and developing effective and cognitive skills. The experiences provided will help them to build positive self image and gain confidence in themselves.
- A good pre-primary school programme emerges out of the immediate environment of the children. It is need based and the environment around the child is explored and fully utilized.
- A good programme provides plenty of opportunities and time for self-expression of children. They are encouraged to express through any media-spoken, dance, dramatization, use of paint, clay, paper, water, sand, music, story etc.
- A good programme makes them use their whole body and develop wholesome attitude towards it, through various activities to use their body. Rhythmic functioning of body is possible through action songs, dance, good food, rest, elimination and vigorous play.
- A good programme makes use of the experiences of children and meets the needs of children of various age groups and builds a strong foundation for future experiences of formal learning through readiness programme.
- A good programme takes into account the needs of parents and plans with them, through parent education programmes.

The activities conducted in a preschool are referred to as the preschool programme.

Principles of Programme Planning: There are certain basic principles which govern programme planning. Every teacher must keep certain principles in her mind while planning programme for her children. They are as follows,

1. The programme of the pre school should be such that it fulfils the objectives of the preschool.
2. The programme must meet the developmental needs of the children.
3. The programme should include equal number of free play activities and guided activities.
4. The activities should alternate between active and quiet activities.
5. The programme should include activities which satisfy children's need for group activities and individual activities.
6. The programme should include activities which are interesting.
7. The programme should include activities which are functional and meaningful.
8. The programme should be planned co-operatively by personnel involved in preschool teaching.
9. While planning the programme, weather conditions, space available, attention span of children and equipment available in the preschool must all be taken into consideration.
10. Programme should give ample freedom for children to create, explore and experiment.
11. The programme should take into consideration the children with special needs.

Some goals to be achieved through a good programme in a preschool are to help children develop

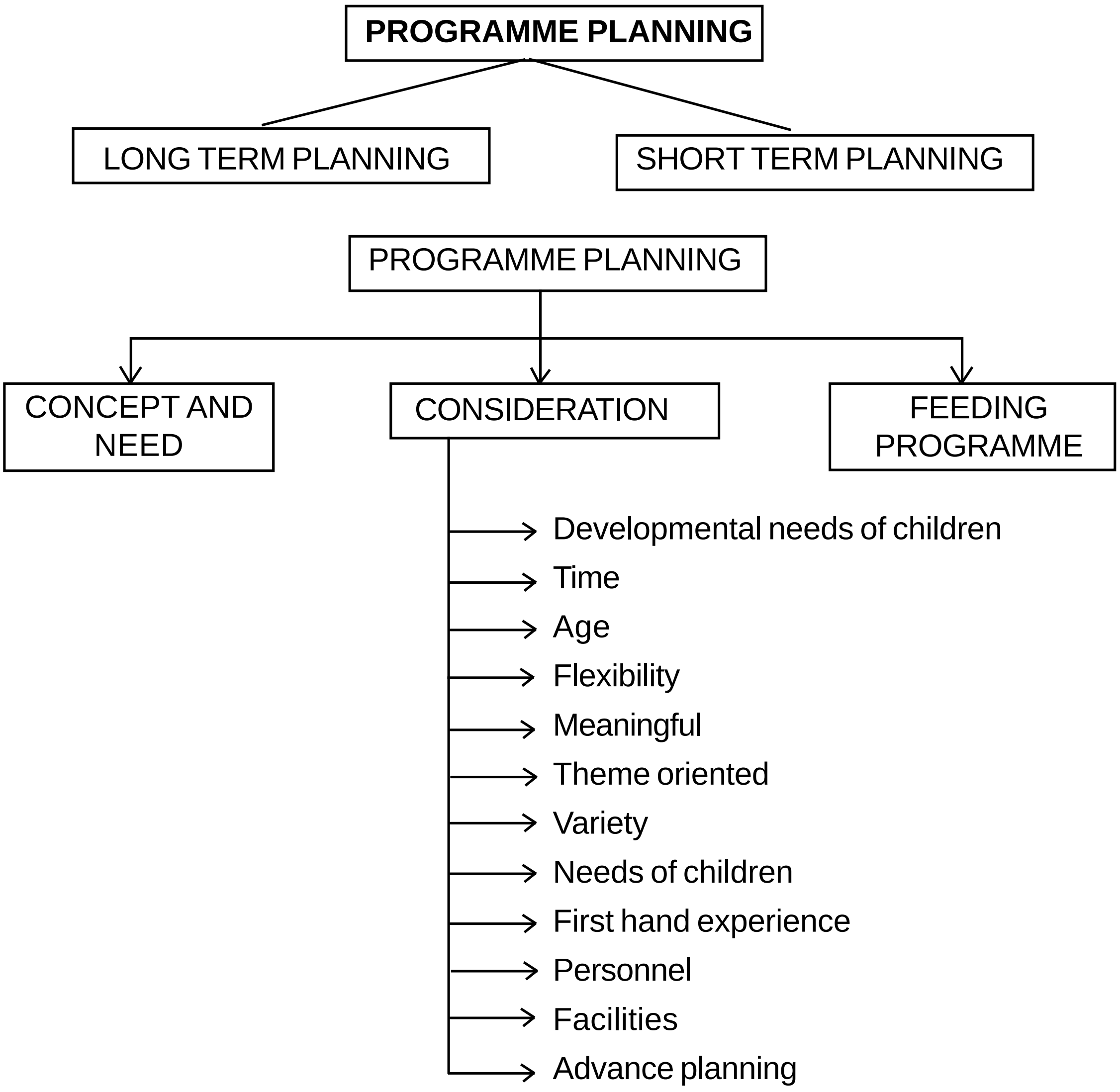
- A good self image
- A thirst for knowledge
- Large and small muscles
- An awareness of the five senses
- An ability to express themselves through materials and movements.
- Language through hearing and using language
- Independence
- An ability to socialize with other children of the same age.
- Knowledge through ample first hand experiences
- Positive attitude towards school and learning.

Time Schedule of Pre School: Time table planning of activities has to be done keeping in mind the objectives of pre school education. A look at the time table clearly depicts the quality of pre school education that is being imparted by an institution. It is a carefully chalked out plan of action that is to be implemented throughout the year in order to achieve the objectives of preschool education. But this is flexible in nature depending upon the interest and needs of the children.

All the activities should be planned in such a manner that there is a balance between indoor and outdoor, individual and group, active and quite activities and activities related

to different aspects of development. In the time table sufficient time has to be given to different activities meant for promoting different developments. The focus should be not only on developing cognitive skills or language skills among children but also, the teacher has to give due recognition and sufficient time to activities that promote physical – motor development, socio-emotional development and development of creativity and aesthetic sense. Figure 9.2 presents the factors to be considered in programme planning.

FIGURE 9.2: FACTORS IN PROGRAMME PLANNING



Types of programme planning: Planning the curriculum may be of long-term, short-term or weekly and daily. Each type of planning leads to the other.

Long-term Planning: This is also called as yearly planning. This type of planning for the year is helpful in giving perspective to daily planning. Factors like teaching aids, budget, materials needed for the school, play equipment needed for the school, celebrations to be held, field trips to be made, the products or themes for every month etc are planned for the whole year. Besides these, a number of administrative factors to be included are,

- Admission procedures
- Working days
- Working with parents
- Staff responsibilities
- Fees structure
- Expansion of programme and any additional facilities required.
- Equipment needed etc.

If the administrator plans all these ahead of time, confusion, uncertainty and other problems could be avoided.

Short-term Planning:

The teacher on the basis of the curriculum given for the whole year breaks up the curriculum into different units and decides the programme to be covered for the term may be of 3 months or 4 months duration. This will contain little more details of different activities to be undertaken during the month.

Monthly Plan for Preschool

June Month

Social Habits:

Creating interest in children to come to school regularly, help the children, tell the name of their parents and their family members, learning to wish the teachers and peer groups.

Health Habits:

Learning good health habits, personal hygiene, learning to wash their hands before and after eating, importance of good food habits, good toilet training and sleeping habits.

Language development:

Learn to tell their names, name of parents, school and the place of location.

Songs:

Teaching songs on healthy living, going to the school.

Story:

Stories related to health habits.

Creative work:

Scribbling in the black board, clay work, paper folding.

Weekly planning:

On the basis of the programme planned for the month the teacher plans the activities for the week. Different themes for every week and organizes the programme according to the specified theme or project. Table 9.1 presents the weekly planning details.

TABLE 9.1: WEEKLY PLANNING

Theme : Park **Age: 4-5 years**

Date :

Activities	Timings	Monday	Tuesday	Wednesday	Thursday	Friday
Arrival of Children	9.15 to 9.30 AM	Arrival of children				
Out door play / Indoor activities	9.30 to 10.00 AM	Outdoor play / Indoor Activities				
Physical exercise / general readiness activities	10.00 to 10.10 AM	Physical exercise / general readiness activities				
Prayer, Informal talk and music	10.10 to 10.20 AM	Prayer song				
		Name of Flowers	Colours of flowers	Uses of Flowers	Parts of Flowers	Smell of Flowers
		Ring a Ring Roses - Songs related with flowers and other songs				
Readiness programme	10.20 to 10.45 AM	English, Reading and Writing	Tamil Reading and writing	Science Reading and writing	Number work	General Concept
Washing up and mid morning juice	10.45 to 10.55 AM	Washing up and mid morning juice				
Creative Activities	10.55 to 11.15 AM	Crayon drawing	Thread printing	Colouring pictures	Threading beads	Field trip to a garden
Basic Special theme related		Pasting of flower petals with leaves	Making flowers with colour papers	Flower printing	Putting flower carpet	
Story	11.15 to 11.40 AM	Story related to the theme				
Science experience	11.40 to 11.50 AM	Flowering stages	Sowing flower seeds	Flower and carpets	Flower arrangement	

Activities	Timings	Monday	Tuesday	Wednesday	Thursday	Friday
Organized games	11.50 to 12.15PM	Theme related games inside / outside the class room				Field trip to a garden
Washing up and Lunch	12.15 to 12.45PM	Washing up and Lunch				
Rest and Sleep	12.45 to 2.40PM	Rest and sleep				
Washing up and evening snacks	2.40 to 3.00PM	Washing up and evening snacks				
Out door play and departure	3.00 to 3.30PM	Outdoor / free play and departure				

The following are the weekly themes that could be taken up for the actitivities

- Family
- House
- School
- Health and Hygiene
- Pet and domestic animals
- Wild animals
- Birds
- Seasons
- Policeman
- Clothes
- Buildings
- Navarathiri
- Karthigai
- Chirstmas
- Deepavali
- Insects
- Fruits
- Tailor
- Green leafy vegetables
- Trees
- Independence Day
- Republic Day
- National leaders
- Krishna Jeyanthi
- Vinayagar Chathurthi
- Doctor

Independence Day Celebration in Pre School

Daily planning: It is the duty of the teacher to plan all the activities which she will introduce to the children. Every day It is not only writng what she is going to do for the day but also getting ready with the materials every day. Doing the activities herself before introducing them to the children to avoid frustration, is an essential element of daily planning. A model daily programme sheet is presented in Table 9.2.

TABLE 9.2: DAILY PROGRAMME SHEET

LKG / UKG

Group : **Date :**

Staff In-charge :

TIME	ACTIVITY
9.45 - 10.45 AM	Reading readiness
10.45 - 11.15 AM	Writing readiness
11.20 - 11.35 AM	Juice / Prayer and informal talk
11.40 - 12.00 Noon	Rhymes / Science experiences / organized game
12.00 Noon - 12.15 PM	Activity 1 & Activity 2
12.20 - 12.30 PM	Story
12.30 - 1.00 PM	Lunch
1.00 - 2.30 PM	Rest and sleep
2.30 - 2.45 PM	Wake up / milk and snacks
2.45 - 3.00 PM	Free play
3.00 PM	Going home

Arranging the learning experiences: The following should be borne in mind while planning learning experience sequence of the pre-primary school programme.

1. Alternating periods of activity and rest.
2. Keeping short period for learning wherein children are expected to sit in one place.
3. Avoidance of vigorous activity immediately before or directly after lunch.
4. Arranging sequence which will provide for easy transaction from one kind of activity to another.
5. Avoiding continuous rearrangement of the rooms for successive periods.

Other aspects to be seen while conducting the programme: • Behaviour problems of children.

- Arranging parent education classes.
- Assisting the teacher to take height and weight measurements of children.
- Arranging classroom things neatly everyday.
- Informing change in the programme earlier.
- Treating all the children alike and giving individual attention.
- Programme should have variety, meaning and should give cultural experiences.

Evaluating programme: Evaluation helps to improve the programme for future. Self evaluation would help to improve their experience and knowledge in programming.

Evaluation can have the following details

- Name of the student
- Date of participation
- Group in which student participated
- Theme of the week
- Activity in-charge
- Aids used
- Activity conducted
- Remarks
- Problems faced
- Suggestions for improvement

Evaluating the Performance of Children

In specific, each activity can be evaluated on the basis of the following criteria sheet.

EVALUATION BY THE TEACHER

Name of the student : Participation Group :

Date of Participation : Theme of the week :

S. No.	Criteria for evaluation	Max. score	Informal talk	Readiness program	Music	Creative activities	Science experience	Story session	Drama-tisation	Organized games	Field trip / sports / cultural events
1	Activities suitable to the theme										
2	Changes included with set up										
3	Collection of materials for the activity										
4	Creativity in display										
5	Presentation / performance										
6	Aids used										
7	Ability to tackle difficult situations										
8	Involvemnet of the student										
9	Orientation activity										
10	Response of the children										

Performance of the student is

- Excellent
- Very good
- Good
- Average
- Below Average
- Not satisfactory

Remarks:

Date: **Signature of the Teacher**

Evaluation is a checking up process of the progress. The efficiency of the process and the quality of the end product are to be checked. When we have clear cut objectives it becomes easier to evaluate the entire process. The success or failure of the programme must be evaluated on the basis of set goals or ends. Educational evaluation is the estimation of the growth and progress of students towards the objectives and values set in curriculum.

Performance of the students

9.4. Teaching Aids - Books, Flash cards, Flannel boards, Models, Real Objects, Blocks, Teaching Methods - Songs, Stories, Drama, Dance, Indoor and Outdoor Play

Teaching is a means whereby society trains the young in a selected environment as quickly as possible to adjust themselves to the world in which they live. In more advanced civilization especially in India, efforts are made not only to adjust things but also in the improvement of conditions of life by training the young in modes of thinking and acting which will help to improve the conditions of living that surround them.

Teaching is a process by which the teacher brings the child and subjects together. The teacher and the taught are active, the former in teaching and the latter in learning. Formal and informal teaching must co-operate if good results are to be achieved.

Main Characteristics of Teaching

- Teaching is giving information
- Teaching is causing the child to learn
- Teaching is helping the child to respond to his environment in an effective manner.
- Teaching is encouraging the child to adjust himself and to his environment.
- Teaching is helping the child to develop his natural powers.
- Teaching is guiding the child to do the right things in the right manner and at the right time.
- Teaching is assisting the child to develop emotionally, intellectually, physically, socially and spiritually.

General Principles of Teaching

1. Principle of activity on the part of the child.
2. Principle of linking school programme with life.
3. Principle of arousing interest in the child.
4. Principle of selection of appropriate teaching and learning material.
5. Principle of repetition or practice.

Characteristics of Right Method of Teaching

- They should aim at inculcating love of work among children.
- They should provide numerous opportunities of participation in various projects and activities.
- They should aim at developing the capacity for clear thinking.
- They should be adopted to suit different levels of intelligence and capacity etc.
- They should be adopted to suit different attitudes and interests of the learners.

The following teaching aids are used in a preschool

Books: Books open up new world for children. They try out their ideas, expresses their concern, learn about their environment, imitate activities, learn social techniques and communicate with adults and peers through books.

Books in the programme of the pre school help children to

- Enrich or supplement their first hand experiences
- Build correct concept.
- Stimulate new ideas.
- Build sound social relationships
- Faster appreciation of nature and beauty.
- Encourage verbal communication with other children and adults.
- Encourage good reading habits.
- Develop deep observation
- Promote imagination and creativity

The teacher should have a place to display attractively a few books to stimulate the interest of the children.

Story Books: In order to gain maximum value from the story telling experience. Criteria to be observed for the selection of books are given below:

- The contents should be realistic since children of preschool age must distinguish between what is real and what is fantasy. So books should be of realistic in nature.
- It should create interest to the young children.
- Entertaining colourful pictures and an element of surprise are necessary.
- Accurate in information, inaccurate information would be a detriment to young minds.
- Interesting in words and sounds.
- Simple in words and descriptive, unnecessary details should be eliminated.
- Short in length.

Science Experiment: Science experiments start from the early part of the life when children are taught fundamentals of life. In fact, everything a child is being taught can be taught in experiment format. Science is anything that is proven to be a fact and experiment is proving the fact to be. Thus when teaching children everything can be taught practically which helps in learning things concretely, never to forget.

For example for teaching concepts like hot and cold, it is not enough for you to touch ice and say cold or dip your finger in hot water and say hot, instead let the child touch something cold and hot and learn the concept.

Importance of science experiments

- It helps the child to learn the concept that a child needs to learn
- The child learns permanently forming the foundations for further learning.
- It is a proven fact that one who learns through practical lesson is far more valuable than what is learnt in the text books.

Science Experiences: Modern man lives in a world of scientific actions. The pre school children can learn a great deal about the subjects (chemistry, physics, biology) if they are

observant, deeply interested and stimulated. Science concepts can be simplified and conveyed to them in many ways.

Values of Science Experiences for preschool children

The values children gain from science experiences help them to,

- Gain necessary first hand experience.
- Develop basic concepts and increase basic knowledge.
- Increase their skills of observation.
- Give opportunities to use tools, experiment and familiar materials.
- Aid them in problem solving.
- Stimulate their curiosity and desire for exploration.

Play Equipment: Pre school education is education through "play-way" method. Children are encouraged to learn through play activities according to their interest and at their own pace of learning. If play-way method of learning is to be adopted essentially there should be large number of play equipment. Piaget the famous cognitive psychologist has stated that children learn through concrete experience. Teaching in the absence of concrete experience will never help in the proper understanding of concepts. Such concrete experiences are given to children through play equipment and other visual aids like story charts, models, etc. Hence the play equipment occupy a pivotal role in preschools.

The following factors are to be borne in mind in selecting equipment for a preschool:

- The play materials must facilitate the all round development of children. They must provide opportunities for engaging in a wide variety of activities. Hence play materials must also be of different kinds.
- The number of play equipment must be in proportion to the number of children in the pre school.
- Play materials must be durable.
- The money available for buying equipment may perhaps be the most important factor.
- The availability of services for repairing the play equipment is an important factor to be considered.

Out door Equipment: There are some out door play materials which are essential for a preschool irrespective of its location whether in urban or rural. Some are called desirable equipment.

The essential or desirable items are given below:

Essential Items		**Desirable Items**	
Jungle gym	- 1	Pedalling car	- 1
Swings	- 1	Cement or drum pipes	
Tricycles	- 2	(to creep through)	- 2
Big balls	- 2	Merry go round	- 1

Watering can	- 2	Slide board	- 1
Sand pit (with different moulds, buckets, tumblers)	- 1	Cage for pets	- 1
Gardening tools	- 1	Low tree branches	- 1
Wheel tools	- 5		
Walking boards	- 2		
Rocking horses	- 3		

Indoor play equipment: Different corners may be set up for different kinds of play inside the preschool.

Play equipment arrangement by corner wise:

- **Doll corner:** Household articles, mini cooking vessels, a cradle three or four dolls, a tea set, a box full of costumes including dresses, shoes, hand bags etc, are the essential items, Doll corners may be partitioned by a small screen in a big room.
- **Block corner:** Blocks are very important indoor play materials. They provide chances for a wide variety of activities, blocks may be made of wood or hard board. Wooden blocks will be stronger than hard board blocks. The blocks may be painted with bright enamel paints. The blocks may be rectangular planks, small bricks, arches, semi circles, squares and triangles. Along with blocks wooden trains, trucks and pulling toys may be provided.
- **Creative activity corner:** This corner may provide materials for activities like carpentry, construction collage work, painting, pasting, threading and playing musical instruments. Tools like hammer, soft wood, screw driver, ruler, yard-stick and bench. Materials like plastic clay, blunt scissors, water colour, brushes, materials for collage work like feathers, leaves, seeds, saw dust, burnt match-sticks may be provided for creative activities. Musical instruments like flutes, small drums, a big drum, kanjiras etc., provide much fun to children.
- **Science corner:** Magnifying glasses, magnets, a weighing balance with different weights, prisms and compass are arranged in shelves in the science corner.
- **Book corner:** This corner may contain story books and picture books which are arranged in shelves and racks. Mats or carpets may be provided for seating.

Play materials from wastes: Many interesting play activities may be given to children using waste materials. The teacher uses her resourcefulness in making play materials for children in the following ways:

- Clay collected from pond or river bed may be given to children for creative activities.
- Seeds may be collected and given to children to make designs on the floor.
- Any waste paper may be given for activities like tearing, cutting and folding.
- Bits of cloth from tailor's shops may be used for preparing cloth balls and dolls.
- Caps of tooth paste containers may be used for printing with colour liquids.

• Empty powder tins may be made into rattle by putting small stones into them.

Play space – Out doors

1. A minimum of 15X20 sq. m. of play space should be provided for a group of 30 children.
2. The place should ensure safety of children (ie.) prevent children from running out and getting hurt from grevious injuries.

Play space - Indoors

1. A minimum indoor space of 5X7 sq. m. is essential for a group of children.
2. Rooms should be well lit and ventilated.
3. Mats and set of low and light tables for a group of 6-8 children for art work and paper work are essential.
4. Room size of 5X9 sq. m. and above may be desirable.

Table 9.3 gives the list of indoor, outdoor play equipment and musical instruments and their values which are needed for preschool children.

TABLE 9.3: LIST OF PLAY EQUIPMENT AND THEIR VALUES

S.No.	Name of the Equipment	Materials used	Values
Out Door Equipment			
1	Rope swing	Tree branch, rope	Large and fine muscular co-ordination.
2	Tyre swing	Puncture tyres, rope	Principle of oscillation
3	Rope ladder	Wood, rope	Balance, hand and arm movements and muscular control
4	Balancing board	Wooden planks, bricks	Body balance and control.
5	Push toys, trolley and roller	Chalk boxes tin, wood, hard board, string	Opportunities for dramatisation, information on wheels, toys / transportation.

S.No.	Name of the Equipment	Materials used	Values
In Door Equipment			
1	Peg board	Wood	Finer muscular co-ordination, releases pent up emotions.
2	Star design board	Wood	Numbers, eye, hand and fingers, muscular, co-ordination, sense of creativity.
3	Threading disc	Ply wood and wood	Size / shape, eye hand co-ordination.
4	Gradation tubes	PVC tubes	Gradation in size.
5	Blocks and bamboo blocks	Wood and Bamboo	Assorted shapes and sizes, imagination, thinking.
Musical Instrument			
1	Drum	Tin, wire	Learn about different materials that produce sounds.
2	Rattles	Wood apple and coconut shells	Learn names of musical instrument.
3	Jalra	Jingle bells, soda lids, wire	Develop awareness in music, rhythmic exercise.
4	Clappers	Thread, beads, bottle tops, shells	Learn to sing the songs in tune with musical instruments.
5	Shaker	Thick wire, plastic jar, soda lids.	Development of sensitivity to rhythm and harmony in sounds.

The Chalk Board: The chalk board is the most common and widely used visual aid. It is called a chalk board because there are many colours can be used on boards for writing. A contrast on the chalk board can be achieved by making heavy or light strokes with white chalk.

Advantages of Chalk Board

1. When there is only one copy available to teach children, blackboard becomes an easily available device.
2. It stimulates interest.
3. It can be readily used during the lesson.
4. It provides an opportunity for review and revision.
5. It helps to communicate ideas visually through illustration and summaries.

Disadvantages of Chalk Board

1. Writing on them is not easy, it needs practice.
2. Lessons once written and rubbed off, if needed should be written again.
3. If the written work is not arranged well on the board, the work may confuse the learners.

Flannel Board: A flannel board helps in story telling reading mathematics or any other subject. The pictures or word cards to be displayed should have at the back sand paper or other things that stick on cloth but can easily come off from the board.

Advantages of Flannel Board

1. Cut outs are prepared in advance and hence save lesson time.
2. Allows step by step presentation.
3. Matter prepared can be preserved for future use.
4. It makes learning, more dramatic and interesting.
5. It sustains pupils attention.

Disadvantages of Flannel Board

1. Making a flannel board and the cuttings take a lot of time.
2. The flannel cloth is not readily available. It is also expensive.

Use of the Flannel Board: A flannel board can be used to show diagrams, assemble parts and classify different things or concepts. Results of group discussions can also be shown on flannel boards. In other words, a variety of prepared aids can be easily shown on flannel board.

Techniques of Using the Flannel Board

- Plan layouts in advance. It is easy to preplan prepared cutouts.
- Rehearse before presentation in the class room.
- Sort the cutouts or cards to be used in order of presentation.
- Presentation should be dramatic enough to attract and hold attention.

How to improve a Flannel Board

- Get a piece of an old clean blanket or back-cloth of any size preferably one square metre.
- Pin or sew it on a cardboard to make it firm.
- Stick them at the back of the pictures or words you intend to use on your flannel board.

Flash Cards: Flash cards are one of the fastest, easiest ways to learn new information and improve fluency. The flash cards are a fun way to teach new targets and increase vocabulary.

For example to teach the child about the proper names for common vegetables, vegetables flash cards can be used. It helps to associate the name of the vegetable with its vivid image through the flash card collection. Vegetable flash cards encourage the child

to recognize the food and its respective name. Vehicle flash card collection help the child to recognize common vehicles like bicycle, boats, trucks, cars, airplanes, etc., Even if the child has not visited the zoo, he can learn about the zoo animals through animals flash card collection. Accompanied by clear audio, children can learn the name of each animal.

Models: A model is a three dimensional object that is made to show some aspects of a real thing. A model can be smaller than the real thing (ie. a globe is model of the earth) it can be larger than the real thing (ie. model of a molecule, a cell or an atom) or it can be the same size (a model of the human heart showing its parts). A model will show some important features of the real thing but cannot show all of them.

The most effective teaching use of a model is to have the students make their own models. This is a good test of whether they understand a concept and it will help them to remember.

Advantages of Models

1. Models are made imitations of the real thing.
2. Models simplify the concept to make it easier for the child to understand.
3. Materials to make models not expensive.
4. Things that are thrown away such as scraps of wood, cloth, tins, paper, cardboards, plastic containers, clay, sawdust, wood, fibres and other things from the local environment can be used.

Real objects (Realia): This means using real objects such as animals, plants, or any other thing in the teeching / learning situation for example alive frog for study rather than in picture.

Advantages of Real objects

1. It is useful and convenient to motivate learners by using real things.
2. This helps to make points clearer and leads to effective learning.
3. It also helps pupils to develop their own ideas or concepts from what is being seen or observed.

Blocks:

Blocks are an early learning tool that helps young children develop their muscles and their minds. Blocks are very conducive for learning. Through play, preschool children can learn concepts and skills as block activities are taken across the early childhood curriculum.

Overview:

Blocks come in a variety of shapes, colours and textures so that preschool children can use them to learn through their senses. Preschool activities for blocks can also help to develop creativity and problem solving. During block play they come to know about shapes, how blocks are positioned (on top of, underneath or behind), how to balance blocks as in stacking and counting blocks.

Pre-maths Blocks: There are several ways to teach maths skills with blocks.

- It helps to explore and discover wonders of mathematical world.
- Children can categorize them according to shape, size, length, width and height.
- Patterns made help preschoolers understand serial order (first, next, last etc.).
- Blocks can also be used as a unit of measure.

For teaching maths through play ask simple questions like,

- Count the blocks and note it down.
- Help the children to measure the size (their legs, feet etc.).
- Measure and identify the longest thing and the shortest.
- Making 3-D puzzle with blocks that helps children to understand about shapes and problem solving.
- With a pencil or crayon trace around each block to form an outline of the blocks shape. Remove the block and make children to put each block back in the correct area.

Dramatic play with Block: Dramatic play and creativity go hand in hard when playing with blocks. For example place the blocks on the floor and invite them to build a town. There is no right or wrong way to use them. Ask them to arrange like toy people, cars, trees etc. to make the town realistic. Making story about this town would be fun, ask plenty of questions to help the children create the scene.

Letter Recognition during Block Play: For this activities alphabets blocks are needed (wooden or plastic) Pre school children are very proud of their names and using alphabets blocks can help teach children the alphabets letters as well as name recognition. Print the child's name (large letters) on paper and invite her to trace the letters with her finger.

Making Music with Blocks: Give each child two blocks and ask them how they can make sounds with blocks. Demonstrate how to clap the blocks together to make a sound. Create pattern of rhythms by clapping the blocks a desired amount of times. Rub the blocks with sand paper to make sounds.

Preschool activities for blocks are endless as there are many creative ways to build and use blocks in the class room. Block play is also very developmental as it aids children in both fine and gross motor skill building. Choosing kid activities require you to consider all the effects it may have in their future. Thus wooden blocks have various physical, social and educational benefits to a preschool child.

Music: Children require outlet for their feelings. Music is one of the constructive ways in which children can give vent to their feelings. The world is full of sounds. Developing and appreciation for music will be a life long asset.

Importance of Singing: • Music changes his temper, mood and expression.

- How does a duck walk, what sounds are made by the clock on the wall by observing to these activities, they incorporate music in their lives.
- Young children learn to control their voices for pitch and tune.
- Children learn to listen carefully thereby increasing their awareness and appreciation.

- A shy child can be helped to join with other children in music. After he had the opportunity to sing with others and if we observe him we can understand that he feels comfortable.

Selection of Songs in Preschool: Every language has many songs for children. A balanced variety should be maintained.

Criteria for choosing songs include:

- Content
- Vocabulary
- Tune
- Rhythm
- Volume
- Actions

In order to inculcate the spirit of appreciation of music, the following points are to be kept in mind

- The words of song should be easy and known.
- They should be sweet in tune.
- Their meaning should be simple and clear.
- The subject matter of the songs should be in accordance with the understanding level of the class.
- Songs of patriotism, heroism, the use of names of birds, animals, toys will be good.
- Children like group songs than individual songs.
- In accordance with the changing interest of children and use of newer techniques and newer insights.

Stories: Story telling is one of the activities by which the teacher becomes acquainted with the children and thus builds a relationship with them.

Importance of Story telling:

- Children learn to identify the feelings of others.
- Interest in various subjects is answered through story telling.
- They learn the tradition of their own nation and religion.
- They are introduced to foreign ways and cultures.
- Moral lesson can sometimes be incorporated as the meaning of story.
- Visual images develop with the story tellers interesting way of describing vocabulary and awareness of language as new words are learnt.
- The children's capacity to verbalize expands as they tell stories themselves and describe the same thing in different ways.
- They come to understand the story sequence with beginning, middle and end.
- As they try to recall persons and events memory power sharpens.

Dramatization: There are many activities that are fun and at the same time help children to gain confidence (eg.) dramatization. Power to express themselves and to make a contribution is done through the activities such as drama, clubs, meeting, play acting can help to restore children's interest in things around them and build up their self respect.

Plays are a useful starting point for discussion. Children could use the story line on the different characters and make up new plays.

For example: A play about cat and mouse

The group of children form a circle. One person stands in the center of the circle. This is the “Mouse”. One person stands outside the circle. This person is the “Cat”. The cat has to try to catch the mouse. The group tries to stop the cat reaching the mouse. Thus the children learn about mouse and cat and they learn to play in a group also.

Drama classes for Preschoolers: Preschoolers are excellent observers. They use almost all their senses in gathering information about anything and everything. Most of what they have learned and understood came from their plays and games. Preschoolers very much enjoy playing “Pretend” with one another. From this we can meet their interest with our goals of teaching them.

Drama classes for preschoolers can bring in much benefit as follows:

- For the inquisitive minds and creative minds, drama offers an avenue for them to express their feelings and general view of the world around them.
- Through drama they can interact with the teacher and with their peers getting them ready for more fruitful interactions ahead.

Dance: Every person can learn from dancing. Every child deserves the opportunity to dance. For babies and toddlers creative movement offers a range of experiences that facilitate natural, easy play and proper development of alignment and neurological co-ordination. Baseline dance setting can help to provide an essential educational experience. Through movement, songs, games and rhymes, children not only flex their muscles as they gain strength and endurance, but they challenge themselves emotionally and cognitively as well.

Creative Dance: • Creative dance offer ample opportunity for both boys and girls to hop, bound, run, dive, leap, jump, turn etc.

- Creative dance also relies on linguistic play like rhymes and games that involve the use of fun, new language and vocabulary.
- Academically speaking in ten week session of creative dance for preschoolers the child learns most of the basic academic bases they will climb into their elementary education.
- It helps children to embrace new ideas that foster community building and social connections.
- Children learn to accept the differences and they gain necessary vocabulary to sort out their experiences with any enriching educational activity consistency is “KEY”. If they involve in regular creative dance class, they have chance to build on the conceptual vocabulary and gain great understanding of the material.

Few benefits of creative dance for preschoolers

- Increased body awareness, aesthetic comfort and ease.

- Improved alignment, flexibility and neurological patterning.
- Emotional and social growth and development.
- Greater self-esteem and autonomy.
- Linguistic and oral (listening) skills enhanced.
- Beginning understanding of academics such as maths, reading, spelling and science.
- Approaches “Class room skills” necessary for school experiences such as taking turns, following directions, listening, sharing and communicating needs and feelings.
- Develops an early creative spark in individuals and groups.

Activities of Children in Pre School

9.5. Setting up a Creche

All over the world it has been realized that the care and training provided to children in the first six years of their lives is extremely important. Creche create safe heaven for the children under the supervision of trained teachers and crèche workers. An integrated day care program caters to the educational, nutritional, health, recreational and emotional needs of children from birth to twelve years of age. Creche also attempt to preclude child labour, subsistence, abuse and child delinquency from the lives of the under privileged families.

Objectives

1. To provide integrated day care to children and to help them join the mainstream of education as soon as they are ready.
2. To try and help to make their environment as healthy as possible.
3. To acquire some types of vocational skills according to their natural tendencies and capabilities.
4. To offer day care for children from 0-12 years while their mothers are at work.
5. To provide them with safe shelter in the midst of the harsh environment in which they are compelled to live.
6. To provide well balanced nutrition to the children while they are at the day care centre. This will help to obviate the omission of the meals that their parents give them.
7. To provide non-formal education at the balwadi and primary school level.
8. To provide recreational facilities to children.
9. To provide services which will promote good health and attempt to prevent or cure childhood diseases.
10. To educate the parents of children on child care, child development, health and social issues.

Planning for a Creche: If you are planning to set up a crèche, certain regulations and standards of health, safety and welfare must be considered. The regulations cover important areas such as child/staff ratios, premises and facilities, floor space, ventilation, sanitation, food, safety measures, facilities for rest and play, insurance, administration etc. and have initial and on going cost implications.

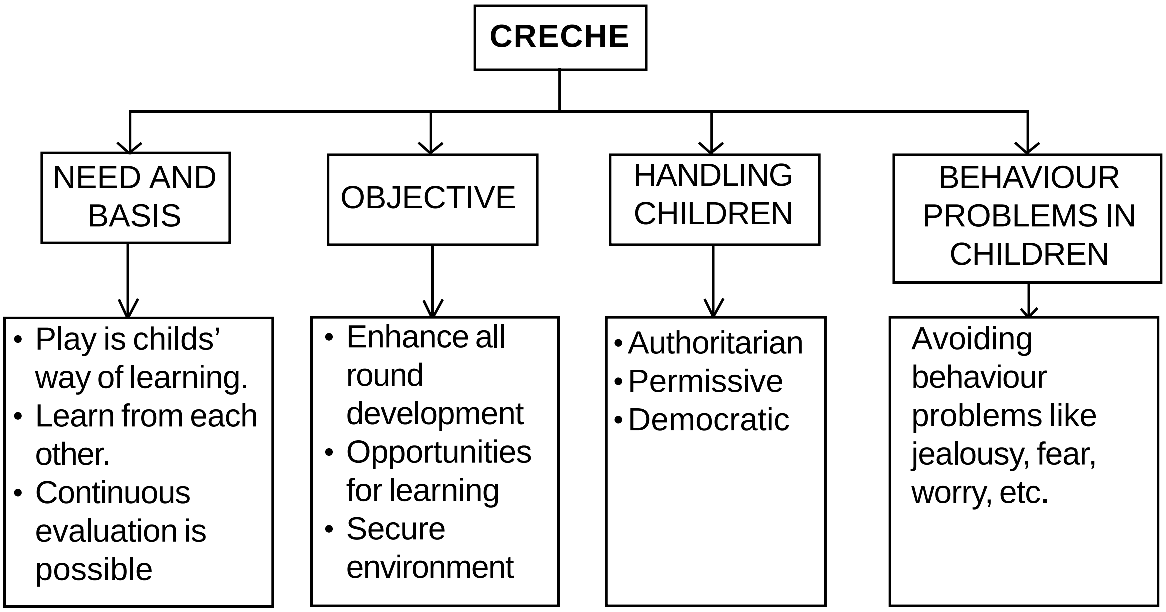
Steps to be followed while planning to set up a crèche:

The basic standards to be possessed by a child care worker or child minder,

- Have completed a first aid course.
- Have a landline telephone on the premises.
- Have a second person in the area to call on in an emergency.
- Have completed a professional child minding course.
- Have the relevant insurance to practice as a child minder.
- Offer the parents two references from previous parents or employers.
- Have a child care committee which will provide training and advice in meeting the basic standards for child care as well as grants.

Figure 9.3 presents the various aspects of a creche.

FIGURE 9.3: VARIOUS ASPECTS OF A CRECHE



Running day care centres: Child care programme includes crèches (0-3years), Balwadis (3 to 5 years) and Non-formal education classes (6-12 years). The teaching methodology is creative using art, craft, games, educational visits etc.,

- Health care for the children, and pre-natal and post-natal care for mothers.
- Nutrition comprising milk, mid-day meal and special diet for undernourished children. As per doctor's advice, milk is provided to lactating mothers.
- Recreational facilities which include, educational visits, cultural celebrations, sports day, stimulating games, etc.
- Attempting to integrate children into the formal school system, and helping them to maintain a satisfactory standard and / or provide vocational training to them.
- Establishing community outreach programmes like meeting parents on child care, hygiene, nutrition etc.
- Running a creative unit to develop appropriate low cost techniques and teaching aids.
- Selling products created by children like painting, greetings cards, pouches, bags etc at exhibitions mainly with the aim of creating appreciation of their work.
- Conducting workshops and training programmes on request in the area of childhood care, child development and non-formal education to create an awareness among people.
- Creche is often invited to conduct sessions and to other places of puppet shows for schoolchildren, low cost teaching aids, crèche management etc.

  Thus crèche provide a safe home for children and it also helps to get education as well as good nutrition in the absence of their parents.

Questions

PART - A

I.A) Choose the Correct Answer

1. A rural pre school is called as ____________
   a) Nursery school b) Montessori school c) Balwadi
2. Yearly planning of a preschool is called ____________
   a) Short term plan b) Long term plan c) Monthly plan
3. Different themes will be used for ____________ planning of programme in a preschool
   a) Monthly b) Yearly c) Weekly
4. ____________ give preschoolers first hand experience
   a) Books b) Activities c) Both books and activities
5. Outdoor play space required for a group of 30 children in a preschool is ____________
   a) 15 x 20 sq.m b) 30 x 10 sq.m c) 10 x 10 sq.m
6. The room size of a preschool should be ____________
   a) 3 x 5 sq.m b) 5 x 9 sq.m c) 7 x 8 sq.m
7. ____________ is an indoor equipment
   a) Rope swing b) Peg board c) Rope ladder
8. An integrated day care centre is called a ____________
   a) Creche b) Balwadi c) Preschool
9. Problem solving skill is developed through ____________
   a) Counting blocks b) Models c) Both
10. Displaying of pictures or work cards is done by using ____________
    a) Flannel board b) Charts c) Paper

B) Answer in one or two sentences

1. Mention any 4 types of preschool.
2. Who began the concept of a nursery school?
3. Mention the floor area for a child in a preschool.
4. How much space is needed for a child to play in a preschool?
5. Mention the two types of preschool programme planning.
6. Write any two creative works for preschool children.
7. Mention any two themes for weekly activities of a preschool.
8. Write any four essential items for outdoor play equipment.
9. Mention any two equipment needed for science corner.
10. Outline any 4 criteria for choosing songs.

PART - B

II. Answer in five lines

1. Mention any 4 objectives of preschool education.
2. Define Balwadi.
3. How can safety be ensured in a preschool?
4. How do you arrange learning experience in a preschool?
5. Write the criteria to be observed in the selection of books for children.
6. Mention the importance of science experiments.
7. State the values gained through science experiences.
8. Mention the items required for a doll corner.
9. Write the techniques used in flannel board.
10. Mention the advantages of models.

PART - C

III. Answer should not exceed one page

1. Explain the need for a preschool.
2. State the objectives of a preschool.
3. Draw a model plan of a preschool.
4. State the characteristics of a balanced curriculum for preprimary school.
5. Explain the principles of preschool programme planning.
6. Depict the factors in programme planning.
7. What is daily planning in a preschool? Write the daily programme sheet.
8. Explain the main characteristics and general principles of teaching.
9. Discuss the following teaching aids.
   a. Books   b. Flannel board
10. Discuss on science experiment.
11. Tabulate the indoor and outdoor play equipment and their values.
12. Discuss the value of music in pre school teaching.
13. Explain dramatization in a preschool.
14, Write the various aspects of a creche through a diagramatic representation.
15. Day centres - Write a short note.

PART - D

IV. Answer in Detail

1. Write about the types of preschool.
2. What are the essentials of a good preschool building? Discuss in detail.
3. Tabulate the weekly planning of a preschool. List some weekly themes.
4. Discuss different corners in indoor play.
5. Explain how counting blocks are used in preschool activities.

10. ACTIVITIES IN PRESCHOOL

10.1. Records – Types and Maintenance

Records are of great value in guiding the behaviour and planning the education of the individual child, for evaluating programmes, methods and outcomes in relation to the objectives of Nursery school in order to improve the techniques used. It is also a type of equipment which is important in a preschool, so are the records important for running a preschool. Records are valued for their permanence. Matters related to preschool of the present will be useful in future only when they are recorded. A number of registers and records are maintained because of the following uses:

Uses of Records

- For any one who want to know about the activities of the school, the records and registers are of great help.
- Records help to further the knowledge about children's development and to have a better understanding of individual children.
- Cumulative records help us in understanding the normative and deviant behaviour of children. Parents come to know about their children's behaviour outside home.
- The observation record maintained by the teacher on the behaviour problems exhibited by children helps us to understand the individual needs of children. For example, a child who has a feeling of rivalry, express it by beating the dolls in the dolls corner.
- Records provide data for placement of children: The cumulative folder maintained for each child provides information about child's abilities and aptitudes.
- Based on the preschool records, the teacher can anticipate certain kinds of academic behaviour from each child.
- Records help the teacher in planning the curriculum**:** By recording the participation of children in various activities, the teacher acquires the knowledge of what children can do and what they cannot do and plan the curriculum.
- Records provide in-service training to teachers**:** The teacher learns continuously in her dealings with children. She can try out different teaching methods and keep a record of the results.
- Evaluation**:** Records help in the evaluation of the programme of the nursery school.
- Records provide data for research**:** The nursery school is a human relationship laboratory. Data about human development and human relationship can be obtained from the records kept by the teacher.

Records maintained in the preschool: The various records and registers kept in a preschool are discussed below.

a. **Admission Register:** This record gives information regarding each child's data of joining the school, age, sex etc. Additionally details about child's family such as parent's name, their address of siblings etc., are also entered.

b) **Attendance Registers:** These include registers for children and staff separately. The average number of children in each class attending the school daily, the regularity of attendance of each child, dropouts if any may all be known from the attendance register. A ready reference about the beneficiaries is available from the attendance register. In some preschools separate noon meal attendance registers are maintained.

c) **Record of Daily Activities:** This record contains information about the day to day activities conducted in the preschool. This will help the teacher in determining which of the activities need to be replaced by new kinds of activities.

d) **Stock Register:** There may be three kinds of stock registers. One is for permanent items like tables, chairs, bureau. The second one is for semi-permanent items like mats, brooms, buckets. The third one is for consumable items like crayons, colour powder, chalk piece. These registers provide information about the number of items, cost of each, place of purchase etc. and help the authorities in checking the stock. They help the teacher to decide which article is to be repaired, replaced or discarded.

e) **Health Record:** This consists of individual sheets for individual children stating the health particulars of them. The illness suffered by the child, immunization particulars, month wise weight increase etc., are noted in the health record. This record helps in the assessment of health and nutritional status of the children attending the school.

f) **Cumulative Folders:** Individual folders for every child may be kept in which the child's progress in each of physical and motor, emotional, intellectual and social development is noted periodically. This will help all those interested in the child to know whether he is benefitted by the school, which area of development is fast and in which area additional attention is needed.

g) **Record of Parent's Meeting:** Record of parents meeting and parents participation aims to determine how much the parents participate in the school programme. The various activities in which parents take part at school, the nature of their participation and frequency of participation are also noted.

h) **Other records:** Records of parents teachers meeting, record of home visits by the teacher, record of inspection report, record of visitors and record of lesson plan are the other records maintained in the preschool.

i) **Individual Child Record:** The teacher rates the child in different aspects of development. In addition she checks against the factors that interfere with his development, special interests, abilities and his special problems. The teacher has an opportunity to observe behavioural incidents which have significance in indicating a particular child's level of development or need for specific help.

Thus, records are of immense value in planning the education and evaluation of programmes. They are also valuable for parents to inform the behaviour and progress of their child at school. Records are also indispensable for understanding the child and for the information of successive teachers under whom the child would study.

10.2. Preschool Teacher – Qualities and Functions

"The teacher is the image of Brahma – the creator" says Manu, the ancient law giver. As an incompetent doctor is dangerous for the physical welfare of the people, so an incompetent teacher is much more dangerous to the nation since he injures the personalities of the children and crams their very soul. Following are the important characteristics of an efficient teacher.

1. **Character:** In view of the fact that his beliefs, ideas and modes of behaviour greatly affect the child, it is very essential that he should be a man of sterling character.
2. **Knowledge of Psychology**: Knowledge of psychology goes a long way in providing that basic orientation towards problems of education and child development without which there would be considerable waste of time, energy and human resources. Knowledge of child psychology helps the teacher to understand the individual differences of children.
3. **Grasp over the Method:** The teacher who adopts proper methods of teaching will show good results and his teaching will be more effective.
4. **Respect for the Individuality of the Child:** A child should not be treated just like a dumb driven cattle, he has his own individuality. The secret of education lies in respecting the pupil. A child wants to be heard.
5. **Just and Impartial:** A teacher should not show any favour to some children. All should be equal in his eyes.
6. **Patience:** A dutch proverbs goes "A handful of patience is better than a bushel of brain". Good habits in the students are not formed overnight. It requires time and patience to bring them on the right lines.
7. **Experimental Attitude:** He must not have a conservative outlook but use every developed method in his class. He must devote his time to explore new methods for teaching.
8. **True to his Command:** Less commands to the students should be given and if given they must be stuck to otherwise they will lose their effectiveness.
9. **Judicious use of Praise and Blame:** Praise and blame are the two important weapons in the armoury of the teacher and this should not be used indiscriminately.
10. **Master of the Subject Matter:** He must be a master of his subject. Any weakness on his part will lower his prestige in the eyes of his students. If the teacher does not have sparking fire in him he cannot quicken the mind of the child.
11. **Daily preparation**: However able and experienced, the teacher should have preliminary preparation.
12. **Self analysis on the part of the teacher:** The teacher should find his own short comings and try to remove them. As Ryburn says "self-analysis on the part of the teacher is a necessary equipment".

13. **Humour:** A teacher should have good humour and good nature. These will form the basis for life.
14. **Emotional stability:** Emotional instability of the teacher affects the pupil. The unhappy frustrated, dissatisfied teachers cannot help their pupils to become happy and well adjusted young people.
15. **Skill in questioning and teacher is a guide:** The success of a teacher in the class room depends mainly on the art of questioning. One who questions faultlessly teaches effectively. The teacher is not a instructor or task master, but he is a helper and guide his business to suggest and not to impose.

Guidelines for teachers to make Teaching – Learning effective

- Establish desirable pupil teacher relationships.
- Be interested in things that interest the learners of your class.
- Be sympathetic to the learners.
- Know your job well and do it devotefully.
- Use adequate visual aids.
- Use simple and clear language and learn the art of story telling.
- Pay special attention to weak students.
- Encourage students to ask questions and give suitable answers.
- Have a sense of humour and be patient, use refined and sweet language.
- Be fair in marking and have “Human touch” in dealing with the children.

Seven Fundamentals of Teaching Learning:

A teacher must understand the significance of the following to make his teaching effective.

- Who is to teach?
- How to teach?
- Whom to teach ?
- What to teach?
- Why to teach?
- When to teach?
- Where to teach?

These fundamentals help the teacher to make teaching more effective. School is not the only agency of teaching. Informal teaching is carried on by the parents, brothers and sisters at home, playmates, students, community and outside the class room etc. School should supplement the training imparted by the home and vice-versa.

Evaluation of a preschool teacher: Evaluation helps to improve the programme in future. Every preschool teacher should evaluate her programme critically to assess whether she had been able to accomplish what she had planned for the children and whether the children had benefitted from the programme.

Definition: Evaluation is a checking up process which may help one to move forward.The efficiency of the learning process and the quality of the end product are to be checked. When we have clear cut objectives it becomes easier to evaluate the entire process. The

success or failure of the programme must be evaluated on the basis of set goals or ends. Every pre school teacher should evaluate her programme critically, assess whether she has accomplished what she has planned.

Purposes of Evaluation: Primary purposes of evaluation also try to answer questions like,

- What progress is the teacher making towards the objectives of our educational programme?
- Are the objectives achievable or worthwhile?
- What changes are needed in the curriculum programme?

While evaluating a teacher, she can compare with another teacher's programme for the purpose of improving its educational quality. Evaluation reports of the progress of the individual students to their parents and of the general progress to the school patrols, helps to build good opinion about the preschool.

The main steps in evaluation consists of formulating of major objectives, their translation into specific behavior, selection and construction of suitable rating scales for measuring.

In a preschool at the end of the year the teacher evaluates her work on the following lines:

- Does the child have fine muscle co-ordination?
- Is he able to cut shapes, copy figures etc?
- How much large muscle co-ordination does the child have?
- Is he able to throw a ball in a particular direction or catch the ball thrown to him?
- Is the child ready to go to primary school?
- Can he recognize forms?
- Can he differentiate different sounds?
- Can he identify colours?
- Can he express himself fluently?
- Does he follow when you read to him?
- Does he know his immediate environment?

The teacher reviews the whole years programme and evaluates.

The teacher should analyse the work by answering the following questions to herself:

- Were the objectives of the lesson achieved?
- Which are the learning experiences that were found most interesting by the children? why?
- Which parts of the programme were failures? Why?
- Was any change made in the programme from the original programme?
- Was the time schedule practicable?

Every preschool teacher should evaluate her programme critically to assess whether or not she had been able to accomplish what she had for the children and whether or not the children have benefitted from the programme.

10.3. Project – Case Study, Questionnaire, Observation, Sociometry

Origin of the Project Method:

Like many other progressive methods, the project method is an important contribution of the modern thinkers in education. The project method provides a lot of activity to the students. It provides learning by doing and by handling the problems of life practically. The project method is a revolt against the bookish knowledge. It protects the child from spoon-feeding and mugging up all sorts of information.

It has a wide connection and can be taken to include any activity like dramatics, making models, drawing maps and charts, collecting pictures, preparing scrap books, going on tours etc., which enable the children to learn in a practical manner.

Definition:

According to J.A. Stevenson, "A project is a problematic act carried to completion in its natural setting".

According to William Kilpaatric, "A project is a whole-hearted purposeful activity proceeding in a social environment".

Principles of Project Method

1.The Principle of Purpose: Knowledge of purpose motivates the child to realize his goal. The child must have an idea, 'why is he doing certain things?" Interest cannot be caused by meaningless activities.

2. The Principle of Activity: Children are active by nature. Therefore such opportunities should be provided to them to make them active and learn things by doing physical as well as mental activities. They are to be allowed to do and to live through doing.

3. The Principle of Experience: Experience is the best teacher. The children learn new facts and information through experience.

4. The Principle of Social Experience: The child is a social being and need to prepare him for social life. In the project method, the child works in groups.

5. The Principle of Reality: Life is real and education should be meaningful and real. The child who is to live in a life of reality must be trained as such. The project method provides real life situations.

6. The Principle of Freedom: The child should be free so that he may express himself fully and freely. He must be given the freedom to choose and to do an activity according to his interests, needs and capacities.

7. The Principle of Utility: Knowledge is worthwhile only when it is useful and practical. The traditional system of instruction simply stressed formal and verbal information and was of little utility. The project method develops various attitudes and values which are of great significance from the practical point of view.

Steps in a Project

1. Providing a situation: The teacher's function is to provide real situations for taking up a project. It should be within the intellectual, physical, social, financial and time limits of the students. A project can be individual or a group activity.

2. Choosing and purposing: The project selected must be such as to satisfy a definite need or purpose. This purpose as far as possible, must be acceptable to all the students of a class. The teacher should merely guide and not twist his opinion. The children must feel that the project is of their own choice.

3. Planning: Good planning leads to better results. Each child should be encouraged to give his suggestions. The teacher should point out to the students to take into consideration of their resources. It must be stressed that the teacher must be ready with some proposals regarding the plan beforehand so that it may be possible for him to help the students in the best possible manner.

4. Executing the plan: This step is the longest of all and requires a lot of work. The whole project is to be executed through the cooperative efforts of all students. The various activities of the project should be divided according to the individual interests and abilities of the different children in the class.

This is the stage at which the students perform many activities and learn various useful experiences. The children keep themselves busy in collecting information, reading and writing in various languages, keeping accounts, calculating prices, looking up maps, collecting specimens of different things, measuring length and area, visiting markets, museums and zoos, visiting fields and crops.

5. Judging: The work is to be reviewed when it is completed. Lessons must be learnt from the mistakes that have been made in the various steps of a project. The students should find out what things they have learnt from the project.

6. Recording: A complete record of all activities connected with the project must be maintained.

Merits of the Project Method

1. Based on the Laws of Learning: It is in accordance with the psychological laws of learning.

- **The law of readiness:** According to this law we learn most when our minds are ready to receive. The project method prepares the minds of the students by providing them with suitable situation.
- **The law of exercise:** Learning to be effective must be practised. The project method prepares the minds of the students by providing them with suitable situations.
- **The law of effect:** This law states that if learning is to be effective and fruitful, it must be accompanied by satisfaction and happiness. The students derive immense pleasure when they manipulate their own activities.

2. **Related with life:** Learning becomes practical and intimately related with life when meaningful and purposeful activities are provided to the students. The children get opportunities to acquaint themselves with the real problems of life.
3. **Correlation of all the subjects:** The project method gives unity to the curriculum. Learning takes place as a bye-product of purposeful activity.
4. **Training for a democratic way of life:** The method provides sufficient opportunities to the students to work cooperatively for a common purpose.
5. **Training in citizenship:** This method imparts training to the students to inculcate in them primary virtues like tolerance, independence, open-mindedness, resource fullness etc.
6. **Upholding the dignity of labour:** Dignity of labour is inculcated through the project method. The students learn that there is nobelness in working and doing things with their own hands.
7. **Stress on problem solving:** It discourages cramming and memory work. It stresses problem solving. It develops the thinking and reasoning powers of the students.
8. **Self and social discipline:** As the children remain busy with their self chosen work they do not get opportunities of making mischief.

Demerits:

1. **Neglecting intellectual work:** Project method glorifies hand work at the cost of intellectual work. The critics argue that the children are kept busy in model-making and the like.
2. **Haphazard and unconnected teaching:** It is not possible to deal with all the subjects in single project. There are many topics which cannot be taught through this method.
3. **Upsetting of the time-table:** In a project method it is not possible to follow a rigid time-table.
4. **Neglect of drill work:** This method neglects practice and the development of skill in various subjects. The students do not get adequate drill in arithmetic, reading, spelling, drawing etc.,
5. **Difficulty of suitable textbooks:** Preparation of books suitable for the project method is by no means an easy task. Moreover material required for the implementation of a project is very costly. The method is not suitable for ordinary schools.
6. **Unsuitable for the shirkers and shy:** Some students who are not inclined to take responsibility may remain in the background and do very little work.
7. **Too much reliance to young children:** It is not wise to depend too much on the choice of the children.
8. **Lack of competent teachers:** For the successful working of this method, very efficient and resourceful teachers are needed. The method imposes heavy burden and responsibility upon the teachers.

Project Method and Normal Class Room Teaching

- The first and the main responsibility of teacher is to provide those situations to the students wherein they should feel a spontaneous urge to solve some of their practical problems.
- The teacher must be in the look out of discovering their interests, tastes, aptitudes and needs.
- Pictures of different scenes may be shown to them. Surveys of the surrounding conditions may be undertaken.
- The projects for study and work may arise out of the festivals. The teacher is to tap all resources to provide worthwhile situations.
- The relation of the teacher with his students is very closer in the project method than in the ordinary class teaching.
- The teacher must stimulate the shy students to put in their best. He must help the students to help themselves.
- The teacher must see that the project is carried on in a democratic way. He must read intensively as well as extensively. He should have adequate patience, skill, knowledge, tact and sincerity.

Case Study

In a case study, a scientist or a researcher will analyse the behaviour, emotions, beliefs and life history of a single individual in more depth. Case studies are done generally with the aim of making a practical diagnosis and recommendations for treatment of individuals who deviate from the normal behaviour.

Case study essentially includes case history. The aim of case history is to discover significant influences, past and present that operate on the child. A cumulative record of important events in the life of the individual children will be of great help in collecting past history. The study of this accumulated data enables us to gain a better understanding of the child which will help the clinical psychologist to treat the child in question. Because case study is used to study deviants, it is often referred to as a clinical method.

Questionnaire Method

A questionnaire is a list of questions about the subject of research. These questions may be given to the parents, teachers, others or to the child himself to know about a child. The questionnaire needs to be filled up by the persons concerned. A questionnaire may be of two types, namely open ended and close ended. In the open ended questionnaire, questions ask for the opinion of the respondent in his own words. In the close-ended questionnaire, the answers are given and the respondent has to simply mark them. It is one of the valuable methods for studying child development. In a good questionnaire, the questions are clear and properly worded. It is not lengthy and questions are easy to respond to.

Observation

All science is based on observation. In child development too, this is the basic method by which facts are collected. By observing children over a period of time, we can arrive at clear impressions about them. In olden days, scientific instruments were not available and hence observers did only casual observation and kept a running record of observation. Today's observation accompanies sophisticated instruments like video camera and tape-recorder which are used to get accurate information.

Observation is a practical research tool which provides valuable sources of information in terms of people's development, interactions and behaviours. Within child research, effective observational skills include being able to record data using a variety of observation methods such as,

- Naturalistic observation
- Participant and non-participant observation

Naturalistic Observation:

This is the method of watching behaviour as it occurs in its natural setting. Observation of a child's activity throughout the day and observation of parent-child interactions are examples of naturalistic observation. No interference is made by the observer in the natural setting. Naturalistic observation may be conducted in an informal or structural manner. Simply watching a child's activity and recording without a predetermined aim is an example of informal observation. Naturalistic observation has been useful in getting valuable facts about human behaviour.

Participant and Non-Participant Observation:

While observing and recording child behaviour, the observer may participate in the activities of children and simultaneously observe child behaviour. This method of observation is called participant observation. In some situations the observer may not participate in the activity, but merely watch children and record their activities. This method is called non-participant observation. Whatever be the method of observation, interpretation must be done properly.

Sociometry:

A sociogram is a charting of the inter-relationships within a group. Its purpose is to discover group structure ie., the basic 'network' of friendship patterns and sub-group organization. The relations of any one child to the group as a whole are another type of information which can be derived from a sociogram. A sociogram's value to a teacher is its potential for developing greater understanding of group behaviour so that he/she may operate more wisely in group management and curriculum development.

10.4. Field trip – Objectives, Planning, Factors to be Considered, Places for Field Trip

Field Trip:

Planning field trips can be a great way to give children hands-on opportunities that breathe life into their preschool lesson plans and activities.

Objectives:

- It provides first hand experience of the existing situation to the students through observation.
- It motivates students to learn and they have opportunities to examine material and obtain new ideas.

Planning a Field Trip

Extending kids learning experiences outside the classroom enables them to get concrete experiences that can enhance their understanding of the world around them. In order to make preschool field trips to be successful, they need to be meticulously planned, otherwise these fun outings can become dangerous and chaotic.

Factors to be Considered

1. Decide on a Field Trip Destination: Choose child-friendly places where kids are allowed to touch and explore some of the things they see. Children's museums,zoos, parks and aquariums are all fantastic places to take a bunch of busy preschoolers.

Visit the site ahead of time to scope out rest rooms, rest areas, entrances and exits. Doing a pre-visit inspection will also help to determine what provisions will be needed to accommodate any special needs of children in the class. Most venues have to prepare for large groups of children. So be courteous and call the destination in advance with the date and time of the anticipated arrival.

2. Decide on Mode of Transportation: The mode of transportation used should comfortably accommodate all the preschoolers attending the field trip.

3. Get Signed and Dated Permission Slips from Parents: Permission slips should be passed out one to two weeks before the date of the field trip. This gives parents enough time to read over the information and cover any expenses associated with the trip.

The permission slip should list the place of destination, cost of field trip, time of departure and anticipated time of return. There should also be information about what the kids should wear. It is advisable for all the preschoolers to dress in brightly coloured shirts with the name and telephone number of the child care centre or school displayed on them. This will make it easy for someone to identify children if they get separated from the group.

Parents are busier than ever and things often slip their minds, so send friendly reminders about the importance of returning the signed and dated permission forms for their kids' field trip. Field trip reminders can also be posted on the bulletin board inside the class room.

4. Recruit Parent Volunteers: Having a few responsible adults will safeguard the children and minimize the risk of chaotic situations. Each person should be assigned a small group of children to be responsible for throughout the duration of the field trip.

5. Prepare an Emergency Kit: The emergency kit should contain an extra change of clothes, sanitizing hand wipes, cleansing pads, a cell phone, important medical information, emergency contact numbers, bandages and gauge.

6. Do a Continuous Head Count: Youngsters are prone to wandering – so never move from one location to another without accounting for all of them. Even if the class stays in the same location, periodic head counts should be conducted to make sure none of the kids managed to slip away. If preschool field trips are carefully planned and properly executed, they can be an exciting way to extend early childhood lessons beyond the class room.

Preschool Outdoor Field Trips:

Outdoor field trips or nature walks create wonderful outdoor activities for children and preschoolers to learn new things.

Possible Field Trip Places for Children and Students:

Police Station: Children can learn about the police, what is their function in the community as well as details about the work they do to enforce the law.

Fire service Station: Preschoolers and toddlers can learn about fire fighters, their job details. They can learn about the fire trucks, how they help to pump water and how firemen keep us all safe, plus learn about fire safety.

Library: Children can learn about all the books. They learn why libraries are important, what librarians do and may be even have a few stories read to them from the children's book section.

Zoo: Preschoolers and children learn what zoo's do, what keepers are and their job duties and how they care for the animals. Children may also learn about different animals that are native to their country and those from other counties. They may also learn about different classes of animals like birds, reptiles, mammals.

Garden Park: Children may learn about landscaping, gardening, different types of plants, flowers and shrubs. They may also learn about different colours and caring for the environment.

Walk in the Forest (Nature walk): Children learn to observe nature, what they hear, what they see, smell etc. They can collect leaves, flowers, nuts and other things which can be examined using magnifying glasses in the class room as a kids science activity or use these things to create an art project of some sort with the children.

Railway Station: Preschoolers love trains. They can learn about trains, they can watch them coming into the station. They may even be lucky enough to hear a whistle, talk to a train operator or have a small tour on a train.

Airport: Children and preschoolers can see all the small airplanes depending on size of airport. They can learn about air traffic, how planes fly and how they communicate etc. They may get to work with the pilot or other workers and learn about their job duties.

Grocery Store: Children can learn about different foods. They can learn about food groups, how food is transported and stored and learn about healthy food choices.

Preschoolers love these outdoor activities and field trip activities. They always are eager to learn from the things around them, learn more about the people who make up the community they live in as well as learn about animals and nature.

Follow-up: The follow-up of a field trip involves writing thanking letters to the host and to all others who helped in making it a success, apart from the students.

Garden

Questions

PART - A

I.A) Choose the Correct Answer

1. ____________ are the equipment which is important in a pre school

   a) Records b) Books c) Registers

2. ____________ consists of individual sheet for individual children stating the health particulars of them

   a) Health record b) Cumulative record c) Parent Teachers record

3. ____________ are the image of “Brahma - the Creator” says Manu.

   a) Parents b) Teachers c) Friends

4. ____________ is a checking process

   a) Management b) Planning c) Evaluation

5. ____________ is a problematic act carried to completion in its natural setting

   a) Excursion b) Project c) Field trip

6. A project is whole hearted ____________ activity in a social environment

   a) Purposeful b) Useful c) Objective

7. Psychological laws of learning are of ____________ types

   a) 4 b) 3 c) 5

8. Case study essentially includes ____________

   a) Case history b) Clinical assessment c) Height, weight data

9. All science is based on ____________

   a) Reasoning b) Observation c) Interview

10. ____________ is charting of the inter-relationship without a group

    a) Sociogram b) Pictogram c) Network

B) Answer in one or two sentences

1. Define a project.
2. What is a record?
3. Define a questionnaire.
4. What is a case study?
5. What is a sociogram?
6. Write down the two types of observation.
7. What is field trip?
8. State the steps in evaluation.
9. List any 4 things to be present in an emergency kit.
10. What is nature walk?

PART - B

II. Answer in five lines

1. Write about stock register.
2. List any 5 guidelines for teachers to make teaching, learning process effective.
3. Mention the seven fundamentals of teaching learning process.
4. Mention the primary purpose of evaluation.
5. Write down the psychological laws of learning.
6. Write short notes on naturalistic observation.
7. What are the objectives of field trip?
8. Briefly write on individual child's record.
9. Write about cumulative folders.
10. How will you plan a field trip?

PART - C

III. Answer should not exceed one page

1. List any ten important characteristics of an efficient teacher.
2. How will a pre school teacher evaluate her work at the year end?
3. Enumerate the principles of project method.
4. Explain about project method and normal class room teaching.
5. Mention any 10 suitable field trip places and their importance.

PART - D

IV. Answer in Detail

1. Write about the different types of registers maintained in the pre school.
2. Explain in detail about the merits and demerits of project method.
3. Define field trip and explain the factors to be considered in planning a field trip.
4. Summarise the uses of records.

11. MANAGEMENT

11.1. Time, Money and Energy Management

Resources are essential in achieving the goals. In order to achieve these goals it is necessary to plan and identify all the available resources. Resources are those material and human attributes that satisfy wants of individuals. All resources are useful, limited and inter-related. Time, energy and money are the essential resources needed for accomplishing objectives. The use and abuse of one is reflected in the other.

Time: Time is the great equalizer in that we all get 24 hours in a day so the variable is how we manage those hours.

Energy: Energy is required to do work. It relates to our physical stamina, our ability to focus our energy on specific task. This can vary based on age, genetic make up and individual differences. It is a finite resource and we need to choose its expenditure carefully.

Money: Unlike time and energy, money is potentially unlimited resources at our disposal depending on the circumstances.

Time management: It is a set of principles, practices, skills, tools and systems working together so as to get more value out of time with the aim of improving the quality of life. Time management is not getting lots of things done, but right things are done at the right time.

A good time manager get more things done in less time, but feel more relaxed, focussed and control in life. Improving time management skills can get better results by doing less work because focussing is on the right things rather than less important work.

Definition: Time management is the art of arranging, organizing, scheduling and budgetting one’s time for the purpose of generating more effective work and productivity.

Time management is important for everyone. Time management is crucial for students, teachers, factory workers, professionals and homemakers. Managing work and home responsibilities under the same roof takes a special type of time management. In time management many activities must be paired, eliminated, consolidated or delegated. Time management is flexible to make choices. Good choices lead to better results, while poor choices lead to waste of time and energy. Time management skills can be learned and mastered by any one. Since it needs practice and dedication.

Time management tips: The 15 practical time management tips are given below:

1. Write things down: A common time management mistake is to try to use our memory to keep track of too many details leading to information over load. Using to do list to **“Write things down”** is a great way to take control of our project and tasks and keep organised.

2. Prioritize our list: Prioritizing the activities to be done helps us to focus and spend more time on the things that really matters.

3. Plan our week: Spend some time at the beginning of each week to plan our schedule. Taking the extra time to do this will increase the productivity and balances the important long term projects.

4. Carry a note book: Always carry a small note book with you, wherever you go since great idea or brilliant insight occurs suddenly so, carrying a small notebook help to capture our thoughts before we forget.

5. Learn to say no: Many people become overloaded with too much work because they overcommit. Learn to say no to low priority requests so that you will get free time to spend on important things.

6. Think before acting: Before committing to a new task think before giving the answer. This will prevent us from taking on too much work.

7. Continuously improve yourself: Make time in your schedule to learn new things and develop our natural talents and abilities. Continuous improvement of knowledge and skills increases our marketability and can help to boost our carrier.

8. Think about what you are giving up to do regular activities: It is a good idea to evaluate regularly how we are spending our time. The best thing is to stop doing an activity that is no longer serving us, instead spend the time doing something more valuable.

9. Use a time management system: Using a time management system helps to keep track of everything we need to do, organize and prioritize our work and develop sound plans to complete it.

10. Identify bad habits: Make a list of bad habits that steals our time, sabotage our goals and block our success. Easiest way to eliminate a bad habit is to replace it with a better habit.

11. Don't do other people's work: Instead of doing other people's work as a hero's mentality focus on our own projects and goals, learn to delegate effectively.

12. Keep a goal journal: Schedule time to set and evaluate goals, start a journal and write down the progress of each goal. Go through the goal journal every week to make sure that we are in the right track.

13. Don't be a perfectionist: Some tasks don't require our best effort. For example sending a short e-mail to a friend should not take more than a few minutes. Learn to distinguish between tasks that deserve to be done excellently and tasks that just need to be done.

14. Beware of filler tasks: When we have to do a list filled with important tasks, organizing book case or filing papers can be done little later giving highest priority to important tasks.

15. Avoid-efficiency traps: Being efficient does not necessarily mean that we are being productive. Avoid taking on tasks that you can do with efficiency that do not need to be done at all.

Characteristics of a Time Plan:

1. Fixation of time
2. Sequential pattern
3. Size and composition of participating members
4. Concentration of activity

5. Proper planning and utilization of free time
6. Time for special activities
7. Proper estimation of time
8. Time to meet emergencies

The successful time management involves putting in more time at the outset in order to recognise one's life. Lastly good time management involves keeping a schedule of the tasks and activities that have been deemed important. However good, a time plan may require to be reviewed and evaluated from time to time to see that goals are achieved to the satisfaction of all.

Money management: It is the process of managing money. It includes budgeting, banking and taxes. It is also called as investment management. Money management is a strategic technique employed at making money yield the highest of interest - yielding value for any amount of it spent.

Definition: Money management is the management of financial resources of an individual or business. It is the planning and proposed use of financial resources.

Money management also means giving greater control over outgoings and incomings both in personal and business perspective. Greater money management can be achieved by establishing budget and analysing costs and income.

Unlike time and energy, money is potentially an unlimited resource at our disposal, it can be a tangible resource that we can hold and touch in the form of currency. It is indeed a finite resource and like time, we must spend it carefully in order not squander it.

Powerful techniques for sound money management

- Cutting your budget on social needs
- Avoid any snob-appealing expense
- Always go for the most cost - effective alternative
- Increase expenses more on interest bearing item than any other thing
- Establish the expected benefits of every desired expense using the value of plus / minus / nil to standard of living value system.

These techniques are investment boosting and portfolio multiplying.

Money Management Tips:

Learning effective money management not only enables the person to live comfortably within the available means but also helps the individuals to increase the wealth.

Some money management tips are given below:

1. Set money management as a goal: Money management is a means to an end. Our goal should be practical and be sure that the end is in clear sight. For exzmple if money management goal is to have a comfortable retirement, start with small objectives like paying off a credit card within a particular number of month.

2. Know what you have: Start money management after knowing clearly about our means. The means may vary as

- Cash in hand, cash in bank, credit balance etc.
- Treasure in the form of jewels, dresses, furniture etc.
- All other possessions including vehicles, movable and immovable properties, etc.

3. Track your income: The average income should be split in such a way that unavoidable circumstances like sick days, admission time, etc. handled easily.

4. Track your spending: When you get an income find it out where it goes. Take a month and track your spending down to the penny. Record everything, the bill payment, check, debit and credit card expenditure.

Functions of money management: The function of money management is to ensure financial resources are placed in the appropriate place at the appropriate time. Money management is used to keep control over both income and expenses so that there is always income to pay for expenses. For example, pension funds, mutual funds and professional management of corporate assets. Some personal examples would include estate planning, retirement planning and budgeting.

Uses of money management: Uses of money management can be simple, such as budgeting. It plays a significant role in both forecasting potential problems and ensuring continued income from assets. It can also be used to plan both long term and short term financial goals.

Energy mangement: It is the usage of energy through the organization. Energy management may be a full time task for a dedicated person. It relates to saving energy in business, public sector / government organization and homes.

Importance of energy management: Energy management is the key to saving energy in an organization. Much of the importance of energy saving stems from the global need to save energy. This global need affects energy prices, emission targets and legislation all of which lead to several compelling reasons that insists energy saving in an organization specifically.

The global need to save energy: Globally energy need to be saved in order to

- Reduce the damage that is caused to planet, earth
- Reduce our dependence on the fossil fuels that are becoming increasingly limited in supply

Definition: Energy management is the process of monitoring, controlling and conserving energy in an organization.

Typically this involves the following steps:

1. Metering energy consumption and collecting data
2. Finding opportunities to save energy and estimating how much energy each opportunity could save

3. Taking action to target the opportunities to save energy (ie., tackling the routine waste and replacing or upgrading the inefficient equipment). Start with the best opportunities first.
4. Tracking the progress by analysing the meter data to see how well the energy saving efforts have worked.

The above four steps process applies either way - consider energy saving measure while buying new equipment or upgrading the existing equipment.

Controlling and reducing energy consumption at any organization

Energy management is the means to control and reduce an organization's energy consumption. It is important because it enables to

• **Reduce costs:** This is becoming increasingly important as energy costs rise.

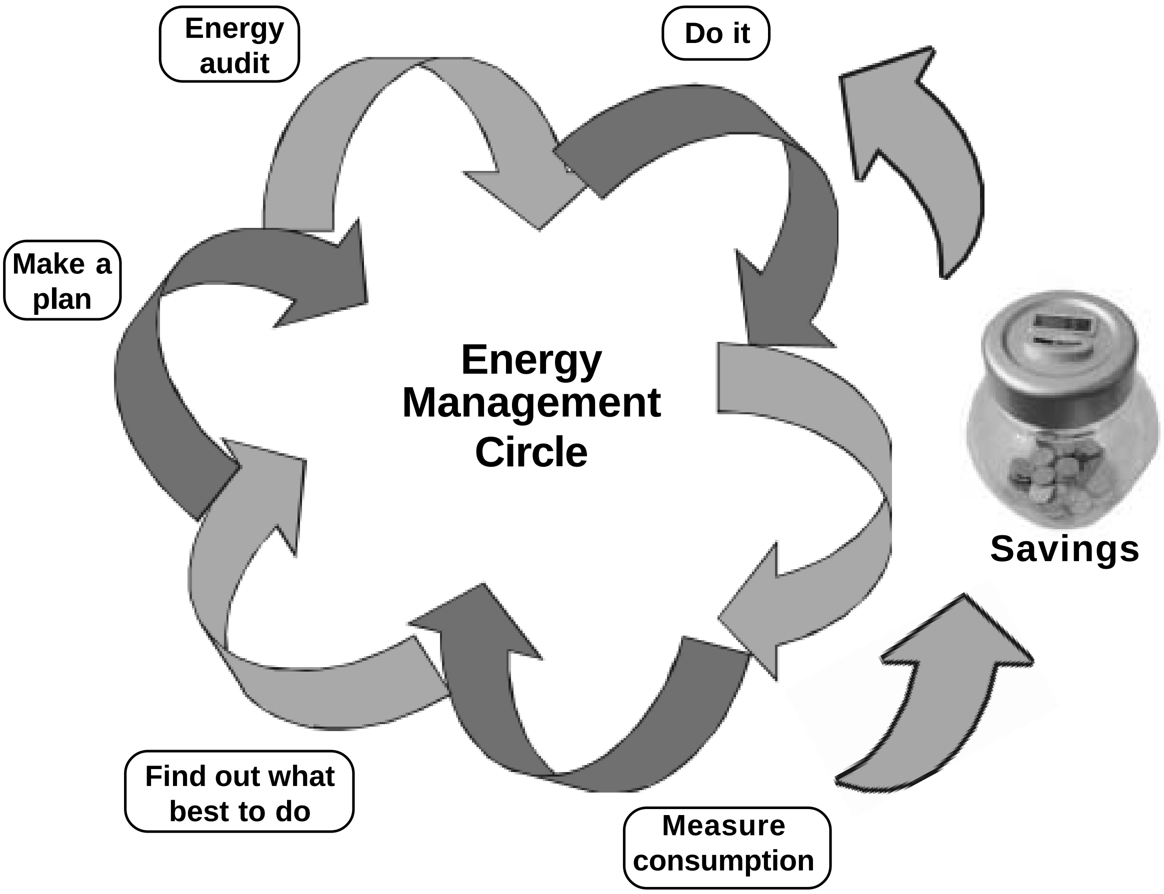
• **Reduce carbon emissions:** The environmental damage that they cause - as well as the cost - related implications of cabon gases and reducing the carbon foot print to promote a green and sustainable image.

• **Reduce risk:** The more energy consumed, the greater the risk that energy price increases or supply shortages could seriously effect the profitability or even make it impossible for the business / organization to continue. With energy management one can reduce the risk by reducing the demand for energy and by controlling it so as to make it more predictable.

The term energy management is also used in other fields.

- The energy suppliers ensure that their power station and renewable energy sources generate enough energy to meet demand.
- It is used to refer to techniques for managing and controlling one's own levels of personal energy.
- It also has relevance in aviation - it is a skill that aircraft pilots learn in some shape or form.

Energy management circle: The energy management circle is a monthly cycle based on monthly readings from meters and data from the energy supply and distribution system. The energy audit is a one time (or perhaps yearly) thing from a starting point to get into the good circle.



There is no management if no data is available. Therefore it is necessary (before the audit) to intall meters. For example water meters or electricity meters on individual building or units of consumption. As a first approach use of LPG can be estimated by a scale or the time between replacements and diesel use can be seen from invoices. Through metering the consumption becomes visible and that is a precondition for management. It is part of human nature that if anything is free we tend to manage it very badly. With the information how much we have consumed, how much we have to pay, we start to manage and control our consumption.

Reasons for doing this:

- To find it difficult to pay
- To protect the environment
- For other reasons

Energy management is to manage energy consumption more or less in the same way as with money. That is drawing up budgets or plans, book keeping, account and audits. It is the same with the usage of electricity, gas and water in our premises according to the number of members, visitors etc. The information collected monthly is entered into a computer and analysed for inconsistencies by the energy manager.

11.2. Small Scale Industries - Objectives, Establishment and Marketing (Advertisement, pricing sales promotion)

Small Scale Industries

Small business enterprises exist in every country. But in a developing country like India the small scale sector occupies a special place in the industrial structure. In our country man power is abundant but capital is relatively scarce. Small scale industries tend to be labour intensive, in view of the vast potential of small scale sector, the government of India is encouraging the growth of this sector.

A small business can bring a lot of success. However, starting a small business can be quite challenging. Correct business ideas, patience and determination are the essential things needed for a small business. Since the time of independence, the small scale sector in India has been a major contributor to country's Gross Domestic Product (GDP). The small scale industries scale in India is acting as an Engine of Growth in the new millennium.

The traditional small-scale industries clearly differ from their modern counterparts in many respects. The traditional units are highly labour consuming with their age old machineries and conventional techniques of production resulting in poor productivity rate whereas the modern small-scale units are much more productive with less manpower and more sophisticated equipments. Khadi and handloom, sericulture, handicrafts, village industries and coir are some of the traditional small-scale industries in India. The modern small industries offer a wide range of products starting from simple items like hosiery products, garments and leather products. The items manufactured in modern small-scale service and business in India are rubber products, plastic products, chemical products, automobile parts, sports goods, stationary items and clocks.

Objectives: The main objectives of developing small scale enterprises in India are as follows:

1. To generate immediate and large scale employment opportunities with relatively less investment.
2. To eradicate unemployment problem from the country
3. To encourage disposal of industries to all over the country covering small towns, villages and economically backward regions
4. To bring backward areas too in the mainstream of national development
5. To promote balanced regional development in the whole country
6. To ensure more equitable distribution of national income
7. To encourage effective mobilisation of country's untapped capital and human resources
8. To improve the level of living of people in the country.

Definition

A small business is a business that is privately owned and operated, with a small number of employees and relatively low volume of sales.

Investment in fixed assets like plants and equipments either held on ownership on terms or on lease or on hire purchase should not be more than Rs.10 million. However the unit in no way can be owned or ancillary of any other industrial unit.

To encourage the growth of small scale industries in India, government has received certain products for manufacture in the small sector. As on 10th October 2008, the following items are reserved for exclusive manufacture by micro and small enterprise sectors.

• Food and allied Industries: Pickles and chutneys, bread, mustard oil, ground nut oil.

• Wood and wood products: Wooden furniture and fixtures

• Paper products: Exercise books and registers

• Injection moulding: Thermo plastic products

• Other chemicals and chemical products: Wax candles, laundry soap, safety matches, fire works, agarbathies

• Glass and ceramics: Glass bangles, ceramic wares

Establishment: The Start-up Process

An entrepreneur desiring to set up an industry must at the outset become familiar with the economic, political and legal environment as under:

- Priorities and policies of the government
- Assistance and facilities offered by various states
- Various organisations assisting entrepreneurs
- Incentives for starting industry
- Government store purchase programme
- Licensing and registration requirements
- Policies and regulations concerning imports and exports and sales tax etc.

After getting familiar, an entrepreneur should understand the procedure for setting up a small scale unit. The main steps involved in the establishment of a small business centres are as follows:

- Selection of the project
- Location of the enterprise
- Preparation of the project report
- Choice of form of ownership
- Registration with the authorities
- Arranging finance for a specific period
- Statutory licenses and clearances
- Acquiring land and building

- Arranging working capital
- Recruitment of staff
- Installation of machinery
- Procuring raw materials
- Power connection and water supply
- Starting production
- Marketing the product

The most important steps to start a small business are explained below:

1. Project Identification

Project identification is the process of identifying opportunities for new business ventures. This process involves collection, compilation and analysis of relevant data for the ultimate process of choosing a suitable opportunity for investment. Project identification requires defining the objectives and characteristics of the selected project.

Every project have their basic dimensions - input, outputs and social costs and benefits. The input characteristics define what the project will consume in terms of raw materials, energy, manpower, finance and organisational set up. The output characteristics of a project define what the project will generate in the form of goods and services, employment, revenue etc. In addition to inputs and outputs, every project has an impact on the society. It is therefore necessary to judge the sacrifice which the society will be required to make and the benefits that will accrue to the society from a given project.

2. Selection of an Idea

To be successful it is important to have an idea with a very good market potential. Small business ideas are as follows:

- People love the idea of working from home. However, network marketing is famous all over the world
- Catering: Catering on a small scale can be done from home especially if the person already have a large and well equipped kitchen
- Children: If a person likes kids and wants to work from home, it is a great alternative to start a day care centre
- Web design: If a person have the skills to be a freelance web designer he can make it from his home.
- Photography: Passion for photography and the right equipment can help in taking photographs in functions like wedding, parties etc.
- Success stories of friends and relatives
- Trade fairs and exhibitions displaying new products
- Market surveys to know trends in fashions

Generation of business ideas or opportunities is also known as Opportunities Scanning and Identification (OSI). After generating ideas, it is necessary to evaluate them so as to identify the most appropriate idea / opportunity. This process is called "Zeroing in process". Following factors should be considered while selecting the product to be manufactured.

- Market potential
- Degree of competition
- An innovative idea which has greater profit potential than an existing product
- Availability of raw material and technology
- Resources and experience of the entrepreneur in the line
- Government policies and regulations
- Suitability of the product to market requirements.

3. Project formulation / Writing a business plan

A business plan is the road map to success. Project formulation is a systematic development of a project idea for the eventual purpose of arriving at an investment decision. It involves a step by step investigation and development of a project idea. A well formulated project is the best passport for obtaining the required assistance from financial institutions. Project formulation will also be of great help in obtaining necessary clearances from the Government. It also enables to meet financial and business goals.

A well planned business plan is essential for starting and running a business. Business plans are required when applying for business loans or seeking investors. A good business plan describes in detail a business mission and goals and how these goals will be achieved.

Expert advice on starting, financing and running a successful business from governmental and non-governmental organisation will ensure a good business plan.

4. Financial feasibility

Various programmes to finance small business is available. Find each one thoroughly, choose the best one suited for the type of project. Federal, state and local governments offer a wide range of financing programmes to help small business start and grow their operations. These programme include low interest loans, venture capital and scientific and economic development grants.

5. Determine the legal structure of the business

When beginning a business, the person must decide what form of business entity to establish. The form of business determines the amount of regulatory paper work that has to be filed, personal liability regarding investments into the business and the tax. The person must need to contact several federal agencies as well as the State Business Entry Registration office. Government has detailed information on the most common business structures.

Sole Proprietorship: A business owned and managed by one individual who is personally liable for all business debts and obligations.

Partnership: A single business owned by two or more people.

Corporation: A legal entity by shareholders

Cooperative : A business or organisation owned by and operated for the benefit of those using its services. Cooperatives are not a legal structure.

6. Register a business name

The legal name of a business is the name of the person or entity that owns a business. If the person is a sole owner of the business, its legal name is the full name of that person. The business legal name is required on all government forms and applications, including tax ID's, licences and permits. However if the name of the shop or selling of products under or different name, then the name should be filed as "ficititious name" registration form with the government agency. A ficitious name is different than the personal name or names of the partners or the official names.

7. Get a tax identification number

All business are required to pay federal, state and in some cases, local taxes. Most businesses will need to register with the state and local revenue agencies and receive a tax ID number or Employer Identification Number (EIN). An EIN is also known as a federal tax identification number and is used to identify a business entity.

8. Register for state and local taxes

In addition to business taxes required by the federal government, the person have to register and pay some state and local taxes.

9. Obtain business licenses and permits

Every business needs one or more federal, state or local licences or permits to operate. Licenses can range from a basic operating licence to very specific permits. Regulations vary by industry, state and local. So it is important to know about them. Not complying the licensing and permitting regulations can lead to expensive fines and put the business at a serious risk.

10. Employer responsibilities

There are many good sources of information about finding the right people, writing job descriptions, interviewing candidates and managing people once they are on board. With these important issues, understanding the regulatory requirements as an employer is crucial to the success of the business.

Marketing

Marketing is the process by which companies create customer interest in goods or services. It generates the strategy that includes sales technique, business communication and business development. It is an integrated process through which companies build strong customer relationships and create value for their customers and for themselves. Marketing is used to identify the customer, to keep the customer, and to satisfy the customer. With the customer as the focus of its activities, it can be concluded that marketing management is one of the major components of business management.

The term marketing concept holds the achieving organizational goals depends on knowing the needs and wants of target markets and delivering the desired satisfaction.

Customer orientation

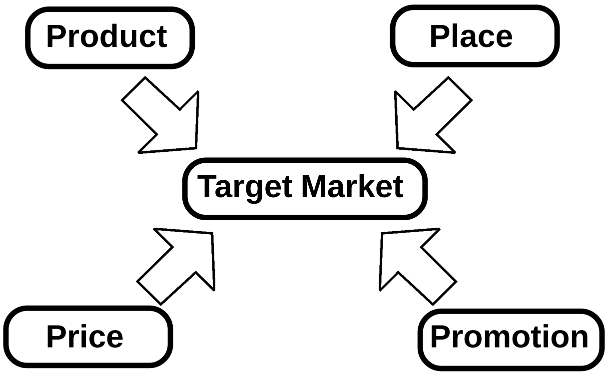
Many companies today have a customer focus (or market orientation). This implies that the company focuses its activities and products on consumer demands. Generally there are three ways of doing this: the customer driven approach, the sense of identifying market changes and the product innovation approach.

Marketing Mix (The 4P's of marketing)

The major marketing management decisions can be classified in one of the following four categories:

- Product
- Place (distribution)
- Price
- Promotion

These variables are known as the marketing mix or the 4Ps of marketing. They are the variables that marketing managers can control in order to best satisfy customers in the target market. The marketing mix is portrayed in the following diagram.



Marketing Mix

Product : The product is the physical product or service offered to the consumer. In the

case of physical products, it also refers to any services or conveniences that are part of the offering. Product decisions include aspects such as function, appearance, packaging, service warranty etc.

Price: Pricing decisions should take into account profit margins and the probable pricing response of competitions. Pricing includes not only the list price, but also discounts, financing and other options such as leasing.

Place: Place (or placement) decisions are those associated with channels of distribution that serve as the means for getting the product to the target customers. The distribution system performs transactional, logistical and facilitating functions. Distribution decisions include market coverage, channel member selection, logistics and levels of service.

Promotion: Promotion decisions are those related to communicating and selling to potential consumers. Promotion decisions involve advertising, public relations, media types etc.

The following table summarises the marketing mix decisions, including a list of some of the aspects of each of the 4P's

Marketing Mix Decisions

Product	Price	Place	Promotion
Functionality Appearance Quality Packaging Brand Warranty Service/support	List price Discounts Allowances Financing Leasing options	Channel members Channel motivation Market coverage Location Logistics Service levels	Advertising Personal selling Public relations Message Media Budget

If any of the 4P's had a problem or were not there in the marketing factor of the business, the business could be in trouble and so other companies may appear in the surroundings of the company, so the consumer demand on its products will become less.

Organizational orientation

Information from an organization marketing department would be used to guide the actions of other departments within the firm. The production department would then start to manufacture the product, while the marketing department would focus on the promotion, distribution, pricing etc of the product. Additionally, a firms finance department would be consulted, with respect to securing appropriate funding for the development, production and promotion of the product.

Advertisement: Advertising is the form of communication intended to persuade an audience (viewers, readers or listeners) to purchase or take some action upon products, ideas or services. It includes the name of a product or service and how that product or service could benefit the consumer, to persuade a target market to purchase or to consume that particular brand. These brands are usually paid for or identified through sponsors and

viewed via various media. Advertising can also serve to communicate an idea to a large number of people in an attempt to convince them to a certain action. Different types of media can be used to deliver these messages, including traditional media such as newspapers, magazines, television, radio, outdoor or direct mail or new media such as websites and text messages. Advertising may be placed by an advertising agency on behalf of a company or other organization.

Pricing: It is the process of determining what a company will receive in exchange for its products. Pricing factors are manufacturing cost, market place, competition, market condition and quality of products. Pricing is one of the 4P's of the marketing mix. Price is the only revenue generating element amongst the 4P's the rest being cost centred.

Pricing is the normal or automatic process of applying prices to purchase and sales orders, based on factors such as: a fixed amount, quantity break, promotion or sales campaign etc. The needs of the consumer can be converted into demand only if the consumer has the willingness and capacity to buy the product. Thus pricing is very important in marketing.

A correct price should do the following things:

- Achieve the financial goals of the company (eg: profitability)
- Fit the realities of the market place
- Support a product's positioning and be consistent with the other variables in the marketing mix
- Price is influenced by the type of distribution channel used, the type of promotions used and the quality of the product

From the marketer's point of view, an efficient price is a price that is very close to the maximum that customers are prepared to pay.

Sales promotion

Sales promotion is any initiative undertaken by an organisation to promote an increase in sales usage or that of a product or service. Sales promotions are varied. Here are some examples of popular sales promotion activities.

• **Buy-One-Get-One-Free (BOGOF)** which is an example of self-liquidating promotion. For example if a loaf of bread is priced at Rs.20 and cost Rs.10 to manufacture, if it is sold for Rs.20, still it is a profit - especially if there is a corresponding increase in sales. This is known as a premium sales promotion tactids.

• **Customer relationship management (CRM)** incentives such as bonus points of money off coupons. There are many examples of CRM, from banks to supermarkets.

• **New Media:** websites and mobile phones that support a sales promotion.

• **Free gifts and discounted prices** are some of the sales promotion techniques.

Free samples: eg. tasting of food and drink at sampling points in supermarkets.

• **Vouchers and coupons:** Often seen in newspapers and magazines and on packs

Competitions and prizes: Announced in newspapers, magazines on the television and radio and on the Internet and on packs.

Finance deals: For example, 0% finance over 3 years on selected vehicles.

Many of the above examples are focussed upon consumers. In a gist, sales promotions are short term incentives to encourage the purchase or sale of a product or service.

Advantages of small business

- A small business can be started at a very low cost and on a part-time basis. Small business is also well suited to internet marketing.
- Adapatability is easier in small business, it is easier to respond to the market place quickly.
- Small business proprietors tend to intimate with their customers and clients which results in greater accountability and responsiveness.
- Freedom to operate independently is a reward for small business owners.
- Small business owners have the satisfaction of making their own decisions within the constraints imposed by economic and other environmental factors.

Problems faced by small businesses

- Small businesses often face a variety of problems related to their size. A frequent cause of bankruptcy is undercapitalization. This is often a result of poor planning rather than economic conditions. Failure to provide fund to the company could leave the owner liable for all the company's debts.
- When the small business owners first start out, underprice their products to a point where even at their maximum capacity, it would be impossible to break even. Cost controls or price increases often resolve these problems.
- Another problem for many small businesses is termed as the entrepreneurial myth or E-myth. The mythic assumption is that an expert in a given technical field will also be expert at running the kind of business. Additional management skills are needed to keep a business running smoothly.

Franchise businesses

Franchising is a way for small business owners to benefit from the economies of scale of the big corporation (franchisor). The small business owner can leverage a strong brand name and purchasing power of the larger company while keeping their own investment affordable.

Questions

PART - A

I.A) Choose the Correct Answer

1. Time, energy and money are the essential ____________ of management.

   a) Elements   b) Resources   c) Items

2. A good time ____________ gets more things done in less time.

   a) Manager   b) Worker   c) Assistant

3. Productivity can be increased by ____________

   a) Thinking   b) Planning   c) Writing

4. The first step in time plan is ____________

   a) Fixation of time   b) Allotting time   c) Spending time

5. ____________ is a tool of financial management

   a) Budget   b) Time   c) Energy

6. The global need is to save ____________

   a) Energy   b) Money   c) Health

7. If more energy is consumed, the energy price will ____________

   a) Increase   b) Decrease   c) Remain the same

8. Injection moulding is used for ____________

   a) Thermo plastic products   b) Paper products   c) Fixtures

9. A well equipped large kitchen are useful for ____________

   a) Catering   b) Homescale cooking   c) Running a tea shop

10. A ____________ is known as federal tax identification number

    a) EIN   b) Tax ID Number   c) PAN number

B) Answer in one or two sentences

1. Define time management.
2. List the essential resources needed for accomplishing objectives.
3. How will you be aware of filler tasks.
4. Define money management.
5. Why energy need to be saved globally?
6. Expand GDP.
7. Define small business.
8. What is web designing?
9. Expand OSI.
10. Mention about sole proprietorship
11. Write about EIN.

12. Define Marketing
13. Write down the 4P's of Marketing Mix.
14. Give some examples of traditional small scale units.
15. Why resources are needed?

PART - B

II. Answer in five lines

1. Write about financial feasibility.
2. Explain the employer responsibilities.
3. Write the pictorial representation of marketing mix.
4. What is meant by customer orientation?
5. Write short notes on franchising.
6. List the powerful techniques for sound money management.
7. What are the other fields which use energy management?
8. How will you reduce risk in energy management?
9. List the exclusive products manufactured by micro and small enterprise sectors.
10. How will you register a business name?

PART - C

III. Answer should not exceed one page

1. What are the characteristics of a time plan?
2. Explain energy management circle.
3. Mention the main objectives of developing small scale industries in India.
4. Write down the steps involved in the establishment of a small business centre.
5. Explain pricing of items.

PART - D

IV. Answer in Detail

1. Explain in detail time management tips.
2. Define money management - Explain its tips, functions and uses.
3. Explore the small business ideas and its selection in detail.
4. Write in detail about popular sales promotion activities.
5. Explain the advantages and problems faced by small businesses.

DESIGN
QUESTION PAPER/UNIT TEST

SUBJECT	:	Food Management and Childcare
CLASS	:	XII (Twelfth)
TIME	:	3 Hrs
MARKS	:	200

Weightage of objectives:

Objectives	K	U	A	Total
Percentage of marks (%)	31	35	34	100
Marks	125	141	134	400

Weightage to form of questions

Form of Questions	ET	DT	ST	OT	TOTAL
Number of questions	7	11	24	54	96
Marks allotted	140	110	96	54	400
Time	1 hr	75 min	75 min	30 min	3hrs

Weightage to content

UNITS	MARKS
I	30
II	50
III	30
IV	50
V	40
VI	20
VII	30
VIII	40
IX	50
X	30
XI	30

Scheme of sections	**A**	**B**	**C**	**D**
Scheme of options	No choice 30/30	10/12	5/7	4/6

Difficulty level

Difficulty	-	10%
Average	-	30%
Easy	-	60%

Note:
- K - Knowledge
- U - Understanding
- A - Application

Form of Questions
- ET - Essay type
- DT - Descriptive type
- ST - Short answer type
- OT - Objective type

BLUE PRINT

SUBJECT : FOOD MANAGEMENT AND CHILDCARE

CLASS : XII

S.N-o.	Objectives		Knowledge			Understanding				Application				Total
	Form of Questions	ET	DT	ST	OT	ET	DT	ST	OT	ET	DT	ST	OT	
1.	Food Quality	1(20)		(1)4					(3)1				(3)1	30
2.	Maternal and Infant Nutrition		(1)10	(1)4	(2)1	(1)20			(2)1		(1)10		(2)1	50
3.	Nutrition for Children			(1)4	(4)1		(1)10	(1)4				(1)4	(4)1	30
4.	Therapeutic Diet		(1)10		(4)1			(1)4	(4)1	(1)20		(1)4	(4)1	50
5.	Food Service Institutions			(1)4		(1)20		(1)4			(1)10		(2)1	40
6.	Food Borne Infections and Food Poisoning			(2)4			(1)10		(2)1					20
7.	Food Preservation		(1)10		(2)1			(2)4				(2)4	(2)1	30
8.	Baked Products				(3)1		(1)10	(1)4		(1)20			(3)1	40
9.	Preschool Education	(1)20			(2)1			(2)4	(2)1		(1)10	(2)4		50
10.	Activities in Preschool		(1)10					(1)4			(1)10	(1)4	(2)1	30
11.	Management			(1)4		(1)20			(2)1			(1)4		30
	Sub Total	(2)20	(4)10	(7)4	(17)1	(3)20	(3)10	(9)4	(15)1	(2)20	(4)10	(8)4	(22)1	
	Total	40	40	28	17	60	30	36	15	40	40	32	22	400

Note: Figures within brackets indicate the number of questinos and figures outside brackets indicate marks

Summary	Numbers	Marks
ET : Essay type	4	20
DT : Descriptive type	5	10
ST : Short answer type	10	4
OT : Objective type	30	1

SCHEME OF OPTIONS

ET	:	Internal choice	4 x 20 = 80
DT	:	Internal choice	5 x 10 = 50
ST	:	Internal choice	10 x 4 = 40

Model Question Paper

Food Management and Child Care

Time : 3 Hrs **Marks : 200**

Part - A ***30x1 = 30***

I. Choose the Correct Answer.

1. The milk secreted soon after delivery is called ....

 a. Mature milk b. Colostrum c. Immature milk

2. .... resembles mustard and are used to mix with mustard seeds.

 a. Pepper b. Argemone c. Sesame

3.Severe liver disease leads to ....

 a. Cirrhosis b. Hepatitis c. Hepatic coma

4.Tuberculosis can be prevented by .... vaccination.

 a. B C G b. D P T c. M M R

5. .... present in egg yolk acts as an emulsifier

 a. Lecithin b. Gluten c. Avidin

6.Specialists are included in .... of organisation.

 a. Line type b. Line and staff type c. Vertical type

7. Fruit peels are used in .... preparation

 a. Jam b. Jelly c. Marmalade

8. .... type of equipment which is important in pre school.

 a. Regards b. Books c. Registers

9. .... is an indoor equipment

 a. Rope swing b. Peg board c. Rope ladder

10. The global need is to save ....

 a. Energy b. Money c. Health

11. Codex Alimentarius is a ....

 a. Food law b. Food market c. Food regulation

12. Increased thirst during diabetes is called

 a. Polydypsia b. Polyuria c. Polyphagia

13. .... is an example of shortened cakes

 a. Pound cakes b. Angel cakes c. Sponge cakes

14. One of the following is the home made weaning food.

 a. Amirtham b. Horlicks c. Bournvita

15. An integrated day care centre is called a ....

 a. Creche b. Balwadi c. Pre school

II **Answer in one or two sentences.**

16. Expand "WABA".
17. Classify cake making ingredients.
18. What is web designing?
19. Define labelling.
20. What are pubs?
21. Define IMR.
22. What is lathyrism.
23. Write down two types of observation.
24. How will you calculate BMI?
25. What is a marmalade?
26. What is appetite?
27. How do you find out the end point of jelly.
28. Which age is called as lull before the storm.
29. Write any two creative works for Pre school children.
30. What is hypertension?

Part B ***10x4 = 40***

III. Note: Write in five lines. Answer any 10 questions.

31. Tabulate a balanced diet for 1-3 years old child.
32. Define food irradiation.
33. Mention the impartance of science experiments.
34. What is spideragoram - draw the diagram.
35. What is meant by customer orientation.
36. Classify the types of fever.
37. What are the symptoms of diptheria.
38. Write the composition of .Kuzhandai Amudhu
39. Write about cumulative folders.
40. Differentate angel cakes and sponge cakes.
41. List out buying tips.
42. Classify preservatives.

Part C ***5x10 = 50***

IV. Note: Write in one page. Answer any five questions.

43. Discuss the causes of obesity.
44. Differentiate Jam and Jelly.

45. Bring out the current immunization schedule.
46. Draw a model plan of a pre school.
47. Explain the moisteners used in cake making.
48. Write down the examples for job specification.
49. List the points to be considered while planning packed lunch.

Part - D ***4x20 = 80***

V. Write in Detail. Answer any four questions.

50. Write about the types of pre school.
51. Discuss the different methods of purchasing foods.
52. Write in detail about popular sales promotion techniques.
53. Write in detail about the dietary management of diabets mellitus.
54. Write in detail about the qualities of a standard cake.
55. What are the complications during pregnancy? Explain.

Glossary

Appetizer : A small portion of fruit juice, or savoury titbits, served as the first course of the meal.

Aleurone layer : The single layer of large cells between the bran coat and the endosperm of cereal grains. Rich in protien, minerals and vitamins.

Anorexia : Loss of appetite

Antibody : A protein substance produced in an organism as a response to the presence of an antigen mainly as a defense mechanism.

Antigen : Any substance such as bacteria or foreign protein that, as a result of contact with tissues of the animal body, produces an immune response.

Atrophy : A wasting away of cell, tissue or organ resulting in the reduction in size.

Brine : Common salt solution.

Broth : An unclarified thin soup

Caramel : Burnt sugar (heating sugar)

Casein : Milk protein

Cheilosis : Lesions of the lips and angles of the mouth.

Caramelized sugar: Dry sugar heated and melted.

Currant : The acidulous berry of a shrub, usually dried.

Custard : A sweetened mixture of eggs and milk which is baked or cooked over hot water.

Colostrum : The thin yellow, milky fluid secreted by the mammary gland , prior to secretion of mature milk.

Dhokla : A fermented steamed preparation made using channa flour or rice flour, with spices and seasoning. Eaten as a snack.

Dumping syndrome : Disorder following food ingestion characterized by sweating and weakness, due to rapid emptying of stomach contents into the small intestine.

Emulsion : A suspension of a light liquid like oil in a heaveir liquid like egg such as mayonnaise, french dressing.

Emulsification : The process of blending fat and water solution to a stable mixture

Egg wash : A mixtuive of eggs and liquid used for smearing.

Enteric : Pertaining to the intestine.

Dusting flour : Distributing a film of flour or starch on pans or work bench surfaces.

Fillings : Sweet cream, jams etc placed between baked layers in cakes, pastries etc.

Frosting : Sugar icing used to cover cakes.

Fondant : Sugar cooked to soft - boiled stage (112°C) and then taken to a fudge like smoothness. It can be used in icing or sweet.

Glace : Sugar so treated as to resemble ice.

Gliadin : One of the two proteins of gluten which provides elasticity.

Gluten : The elastic protein mass that is formed when the protein material of the wheat flour is mixed with water.

Glutenin : One of the two proteins comprising of gluten, which gives strength.

Hypertension : Increase in blood pressure above normal.

Hypoglycaemia : A lower than normal level of glucose in the blood.

Hydrogenated oil : A natural oil that has been treated with hydrogen to convert it to a hardened form.

Leavening : Raising or lightening by air, steam or gas (Carbondioxide).

Levulose : A simple sugar found in honey and fruits

Ketosis : A condition resulting from incomplete oxidation of fatty acids and the consequent accumulation of ketone bodies in blood.

Mayonnaise : Oil in-water emulsion made from vegetable oil, vinegar, salt, spices, emulisified with egg yolk and thickened.

Muffins : Small, light, quick breads baked in muffin pans.

Molasses : Light to dark brown syrup obtained in making canesugar.

Oedema : Presence of abnormal amounts of fluids in intercellular space, resulting in swelling.

Polyphagia : Excessive eating

Rancid : Smell that results from oxidative decomposition of fatty acids.

Stabilizers : Used in meringue pie fillings and icings

Tarts : Small pastries with heavy fruit filling or cream.

Vinegar : A strongly acid liquid produced by fermentation. Commonly used vinegar is cider,made from apple .

Whisk : To beat cream or eggs till a stiff froth is obtained.

Yoghurt : Curd, sour and .sweetened

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